

TEST REPORT FOR FIRE PROPAGATION CHARACTERISTICS OF EXTERIOR WALL ASSEMBLIES

Test Sponsor:

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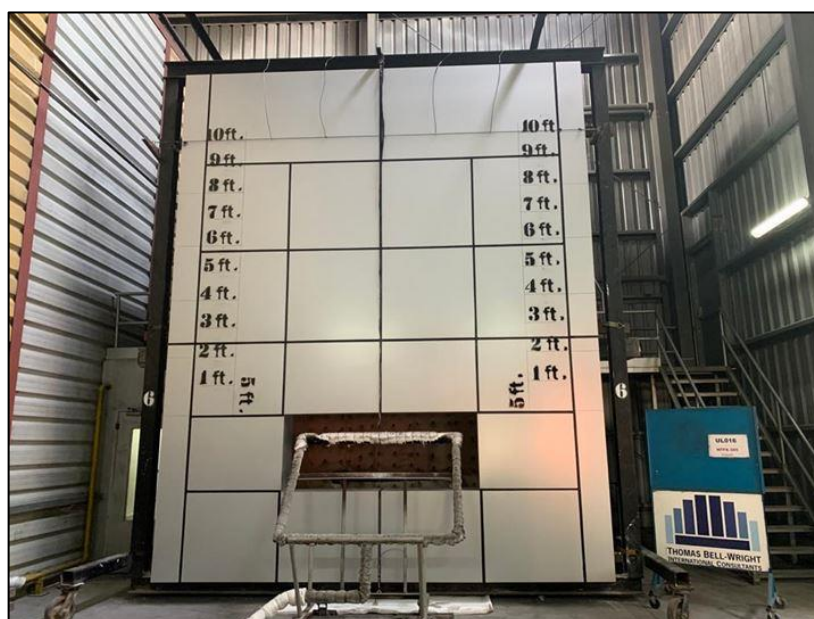
Website: www.idcmi.net

Test Assembly:

4mm thick ALUCLAD-A2 Aluminium Composite Panel (ACP) Cladding Assembly.

Test Standard:

NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components, 2019 Edition.



**THOMAS BELL-WRIGHT
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Test Date: 19-Jan-21
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Test Reference No: UL016

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Accreditation

Testing

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International Accreditation Service (IAS) - Testing Laboratory: **TL-626**
www.iasonline.org



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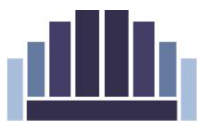


The work which is the subject of this report falls under the accreditation of ISO 17025 IAS.



Table of Contents

1. INTRODUCTION.....	4
2. SPONSOR.....	4
3. TESTING LABORATORY.....	4
4. DATE OF TEST.....	4
5. TEST SAMPLES.....	4
5.1. General Assembly Description.....	4
5.2. Standard Specific Requirements.....	5
5.3. Supporting Construction.....	5
6. SPECIMEN DEFINITION & INSTALLATION.....	5
6.1. Specimen Definition & Verification of the Test Specimen.....	5
6.2. Specimen Installation.....	6
7. METHOD OF TEST.....	6
7.1. Specimen Instrumentation & Measurements.....	6
8. FIRE TEST.....	6
8.1. Ambient Conditions & Test Situation.....	6
8.2. Pre-Test Observations.....	6
8.3. Fire Test Observations.....	7
8.4. Second Floor Test Room Observations.....	8
9. EXTENT OF DAMAGE.....	8
9.1. Exterior Face Observations.....	8
9.2. Interior Face Observations.....	8
9.3. Dismantling Observations.....	8
10. FIRE PROPAGATION ANALYSIS.....	9
11. SUMMARY OF RESULTS.....	10
12. LIMITATION.....	10
13. APPENDIX 1 – ORIENTATION OF THERMOCOUPLES.....	11
14. APPENDIX 2 – CALIBRATION & BURNER GAS FLOW DATA.....	13
15. APPENDIX 3 – COMPONENTS DESCRIPTION.....	14
16. APPENDIX 4 – ASSEMBLY DRAWINGS.....	19
17. APPENDIX 5 – THERMOCOUPLE DATA.....	30
18. APPENDIX 6 – GRAPHS.....	48
19. APPENDIX 7 – CONSTRUCTION PHOTOGRAPHS.....	52
20. APPENDIX 8 – TEST PHOTOGRAPHS.....	57



1. INTRODUCTION

This report outlines the determination of the fire propagation characteristics of a 4mm thick “ALUCLAD-A2” Aluminium Composite Panel (ACP) Cladding assembly according to:

NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components, 2019 Edition.

2. SPONSOR

Name: International Development Company Metal Industries - Sole Proprietorship L.L.C.
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3. TESTING LABORATORY

Name: Thomas Bell-Wright International Consultants (TBWIC)
Address: Corner of 46th and 47th streets, Jebel Ali Industrial Area 1
P.O. Box 26385, Dubai, U.A.E.
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4. DATE OF TEST

The test was conducted on 19-Jan-21, and has been witnessed by the following parties:

Name	Company	Contact Number
Mr. Kamil Mohamed	Intertek International Ltd	+971 50 951 4681
Mr. Amir Y. Alamir	IDCMI	+971 56 515 0444

5. TEST SAMPLES

5.1. General Assembly Description

The specimen was constructed of a base wall onto which Aluminium wall brackets were fixed, screwed into the studs of the base wall through the exterior gypsum wall lining. Horizontal Aluminium runners were connected to vertical Aluminium runners using Aluminium L-Angles and screws at intersections. Later vertical Aluminium Runners were fixed to the Aluminium wall brackets using screws. Horizontal fire cavity barriers were fixed at floor slab levels and along the top horizontal termination of the window head. Vertical cavity fire barriers were fixed along the entire height of the exterior face of the base wall at an offset from the vertical edges of window termination. Mineral wool slabs, as cavity insulation, were fixed onto the exterior face of the base wall using insulation fasteners, covering the entire exterior face of the base wall, except for the location of the cavity fire barriers. The Aluminium composite panels were fixed to the runner profile using Aluminium cleats and screws. Aluminium U-channels were fitted into the horizontal and vertical panel gaps between adjacent panels and were capped off with Silicone based sealant.

The specimen was installed in a capacity where it bore no external load. Loads resulting from the weight of the system components have not been evaluated and are not within the scope of this report, nor are the effects of any wind loading or weather conditions.



5.2. Standard Specific Requirements

Section 5 of NFPA 285:2019 outlines a series of construction requirements, primarily related to joint location, and this section describes the presence of them, or their absence and resulting limitation to field application. All section references below are related to NFPA 285:2019.

In accordance with section 5.7.2.1.2, a horizontal panel joint was located between 1 foot (305mm) and 3 feet (914mm) above the top of the window head.

In accordance with section 5.7.2.2.2, a vertical joint was included in the construction, extending continuously from the window head to the head of the specimen, and was within 1 foot (305mm) of the window opening center line.

As decided by the sponsor, the termination at the window head, jambs, and sill were covered with the ALUCLAD-A2 Aluminium composite panel material, which is not in accordance with section 5.7.3 of the standard. As such, the scope of this test report is limited to the configuration tested, and not alternative materials.

Additionally, the specimen included cavity insulation immediately above and around the termination of the window opening, which is not in compliance with section 5.7.3.2 of the standard. As such, the scope of this test report is limited to the configuration tested, and not alternative materials.

5.3. Supporting Construction

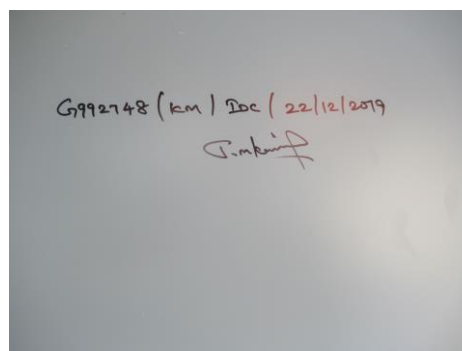
The test assembly was installed on a base wall, which was in turn installed on a moveable test frame constructed of 150 x 150mm steel I-beams with 3 Nos. of 100 x 100mm steel angles welded horizontally at locations specified by the NFPA 285 standard.

The assembly was secured onto the laboratory's intermediate scale multi-story test apparatus (ISMA) and the gaps between the substrate wall and the test room were filled with ceramic fiber blanket with a density of 128kg/m³.

6. SPECIMEN DEFINITION & INSTALLATION

6.1. Specimen Definition & Verification of the Test Specimen.

TBWIC testing laboratory has not been involved in the selection or design of the specimen. However, the materials were selected, marked, and signed by Mr. Kamil Mohamed from Intertek International Ltd Certification Division (Certification Body) on 22-Dec-19 as shown below.



There are contexts where information has been provided by the sponsor and verification of information has been done through either technical datasheet or other document submission, or as indicated directly by the sponsor. For this reason, materials have been tested in an as-received condition and TBWIC bears no liability for the legitimacy of the submitted information. Similarly, the results of the test apply only to the samples as received.



6.2. Specimen Installation

Installation of the specimen: Thomas Bennet Aluminium LLC.

Basewall preparation: TBWIC

The specimen was delivered on 7-Jan-21 and installed between 7-Jan-21 and 14-Jan-21. The specimen was stored in ambient conditions at temperatures ranging between 13°C and 27°C and 21% to 96% humidity.

7. METHOD OF TEST

The fire test was carried out according to NFPA 285: 2019 Edition. The assembly was tested based on values obtained during the most recent calibration as per the NFPA 285 standard, expressed in Appendix 2 of this report.

7.1. Specimen Instrumentation & Measurements

A 100 channel Agilent 34970A data logger was used to record the output of the thermocouples on 15 second intervals.

A total of 54 Type-K thermocouples were used on the specimen, with all interior thermocouples fixed within the specimen placed at mid-depth of the air cavity, nominally 272mm from the interior face of the base wall, as per figure 6.1(b), Detail H in the NFPA 285 standard, shown in Appendix 1, Figure 4 of this report.

The burn room thermocouples were placed at 6 inches below the first story test room ceiling and distributed according to NFPA 285; Fig. 6.1(d).

Thermocouples 55 to 80 were not included in the test as the base wall and exterior cavity insulation were not considered inherently combustible, and their interior temperatures are not required to be monitored.

The window burner was centered on the vertical centerline of the window, 9 inches below the top of the opening, and with the longitudinal centerline of the burner at 3.5 inches from the plane of the exterior wall, consistent with the standard and the calibration of the test apparatus.

For graphs and tabulated data, refer to Appendix 5 & 6.

8. FIRE TEST

8.1. Ambient Conditions & Test Situation

The ambient temperature at the commencement of the test was recorded as 72.1°F and the relative humidity was recorded as 80%. The airflow, measured with an anemometer placed at a right angle and within 1 meter of the test face, at the beginning at test was recorded at less than 0.1m/s. Video recording digital photographs, visual observations and data collection were performed prior, during, and after testing was completed.

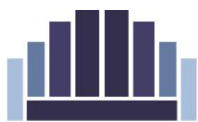
8.2. Pre-Test Observations

The specimen was found satisfactory and fit to be tested.



8.3.Fire Test Observations

Time (mm:ss)	Observations from In Front of the Specimen (Exterior Face) <i>Heights referenced are from the head of the window opening, unless otherwise stated.</i>
0:00	The test was started.
1:30	Smoke stains were observed up to 2 feet height above the window head.
2:55	Smoke stains referenced at 1:30 reached up to the full height of the test specimen.
4:00	The return bend of the panels which represented the window head had slightly deformed.
5:00	The window burner was ignited.
5:52	Flame was observed on the sealant at the panel joint gap on the window sill.
6:05	The external coating on the panels immediately above the window head had peeled off up to a height of 2 feet above the window head.
7:05	The external coating on return bend of the panels which represented the window jambs were observed peeling off.
10:00	The specimen was stable.
11:28	Flaming debris was observed falling from the panel immediately above the window head to the window sill.
11:30	The panels immediately above the window head on both left and right sides of the vertical central line were observed burning.
12:11	Flaming was observed on the interior face of the window opening at the top corners.
12:43	The coating referenced at 6:05 had peeled off further and reached a height of 3 feet above the window head.
13:30	Flaming was observed on the sealant at the central panel joint gap up to a height of 3 feet above the window head.
14:48	The core of the window head return bend panel was observed falling down to the window sill.
15:00	Specimen was stable.
16:01	Flame had propagated horizontally along the sealant strip at the first horizontal joint to a distance of 1 foot on both sides from the central vertical line.
18:00	The coating referenced at 6:05 and 12:43 had peeled off further and reached a height of 4 feet above the window head.
18:20	Aluminium skin of the panel immediately above the window head on both right and left side of the vertical central line was observed melting and dripping.
20:00	Specimen was stable.
24:08	A part of the panel referenced at 18:20 was observed falling down to the floor of the test chamber.
24:30	The flame referenced at 16:01 had further extended to 2 feet on both sides from the central vertical line.
24:32	Flame was observed on the sealant at the central panel joint gap up to a height of 5 feet above the window head.
25:00	Specimen was stable.
26:10	Flame was observed on the sealant at the central panel joint gap up to a height of 6 feet above the window head.
29:00	The flame referenced at 16:01 had further extended to 4 feet on both sides from the central vertical line.
30:00	The specimen was stable, the test was stopped and gas shut off, as per the NFPA 285 Standard, and the 10 minute observation period began.



30:01	Residual flaming was observed on the first horizontal joint and also on the accumulated debris on the window sill panels.
34:33	The residual flaming referenced at 30:01 on the first horizontal joint had ceased.
37:30	The residual flaming referenced at 30:01 on the window sill had ceased.
40:00	The observation period was ended as per the NFPA 285 standard and the NFPA 285 test was completed.

8.4. Second Floor Test Room Observations

Time (mm:ss)	Observations From The 2 nd Floor Room (Interior Face)
0:00	The test was started
5:00	The second floor room was stable.
10:00	The second floor room was stable.
15:00	The second floor room was stable.
20:00	The second floor room was stable.
25:00	The second floor room was stable.
30:00	The 2nd floor room was stable, no flaming was observed, the test was stopped and gas shut off, as per the NFPA 285 Standard, and the 10 minute observation period began.
35:00	The second floor room was stable. No activity was observed.
40:00	The observation period was ended as per the NFPA 285 standard and the NFPA 285 test was completed.

9. EXTENT OF DAMAGE

9.1. Exterior Face Observations

The Aluminium composite panels above the window head had deteriorated up to a height of 2 feet above the window head exposing the horizontal cavity fire barriers at the window head and a part of the barrier at the first-floor slab level. The damage was mainly limited to the central area of flame impingement up to approximately 5 feet above the window head.

The panels above the horizontal panel joint at roughly six feet above the window head were deformed. Panels had soot stains throughout the height of specimen and deterioration of external coating was present between 5 and 6 feet, but were largely intact and not burned through.

The sealant within the center vertical panel joint was observed to have burned away roughly 6 feet above the window head and horizontally the sealant was burned away to a distance of roughly four feet from the central vertical line on both sides in the first horizontal panel joint.

9.2. Interior Face Observations

No damage was observed to the interior of the base wall in the second-floor test room. The gypsum within the first-floor test room was badly burned, but still intact.

9.3. Dismantling Observations

Damage was largely limited to the mineral wool cavity insulation. However, upon removal of it, slight smoke damage and charring was observed on the gypsum beneath the cavity insulation.



10. FIRE PROPAGATION ANALYSIS

Test Performance Evaluation Summary Table		
Test Requirement	Test Observation	Pass/Fail
Flames emitting from the surface of the exterior face of the test specimen shall not reach a height of 10ft or greater above the top of the window opening.	Flames did not reach 10 feet above the window opening.	Pass
Flames emitting from the surface of the exterior face of the test specimen shall not reach a horizontal distance of 5ft or greater from the vertical centerline of the window opening.	Flames did not reach a lateral distance of 5ft from the vertical centerline.	Pass
Flames shall not occur beyond the intersection of the test specimen and the side walls of the test apparatus.	There was no visible flaming beyond the intersection of the side walls and test apparatus.	Pass
Flames shall not occur in the second-story test room.	There was no visible flaming in the second story test room.	Pass
Temperatures shall not exceed 1000°F as measured by thermocouples Tc-11 and Tc-14 through Tc-17.	Tc-11 and Tc-14 through Tc-17 did not exceed the 1000°F limit.	Pass
Temperatures in the wall cavity air space shall not exceed 1000°F as measured by thermocouples Tc-18 and Tc-19.	Tc-18 and Tc-19 did not exceed the 1000°F limit.	Pass
Temperatures in the wall cavity air space shall not exceed 1000°F as measured by thermocouples Tc28 and Tc-31 through 40.	Tc-28 and Tc-31 through Tc-40 did not exceed the 1000°F limit.	Pass
Temperatures measured 1 in. (25mm) from the interior surface of the test specimen within the second story test room shall not exceed 500 °F above ambient air temperature of test facility at the start of fire test as measured by Tc-49 through Tc-54.	Tc-49 through Tc-54 did not exceed the maximum temperature of 72.1°F. (500°F + Initial Ambient Temperature = 500°F + 72.1°F = 572.1°F).	Pass



11. SUMMARY OF RESULTS

The 4mm thick “ALUCLAD A2” Aluminium Composite Panel cladding assembly has been evaluated in accordance with NFPA 285: Standard Test Method for Evaluation of Fire Propagation Characteristic of Exterior Wall Assemblies Containing Combustible Components, 2019 Edition.

The results of the fire performance evaluation conducted on the exterior cladding assembly described herein indicate that the assembly **met** the acceptance criteria stated in the standard.

12. LIMITATION

The results of this test report are only applicable to the type and orientation of the installation which relate to what has been tested. Uncertainty factors with respect to a large-scale fire or changes in design are not considered within the scope of this test report.

TBWIC is wholly responsible for data and information provided in this report, except where indicated by the limitations specified in section 6.1 of this report. This report and all records of the test to which it relates may not be retained by TBWIC beyond 5 years from the date of testing.

This test report is respectfully submitted by: Thomas Bell-Wright International Consultants

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13. APPENDIX 1 – ORIENTATION OF THERMOCOUPLES

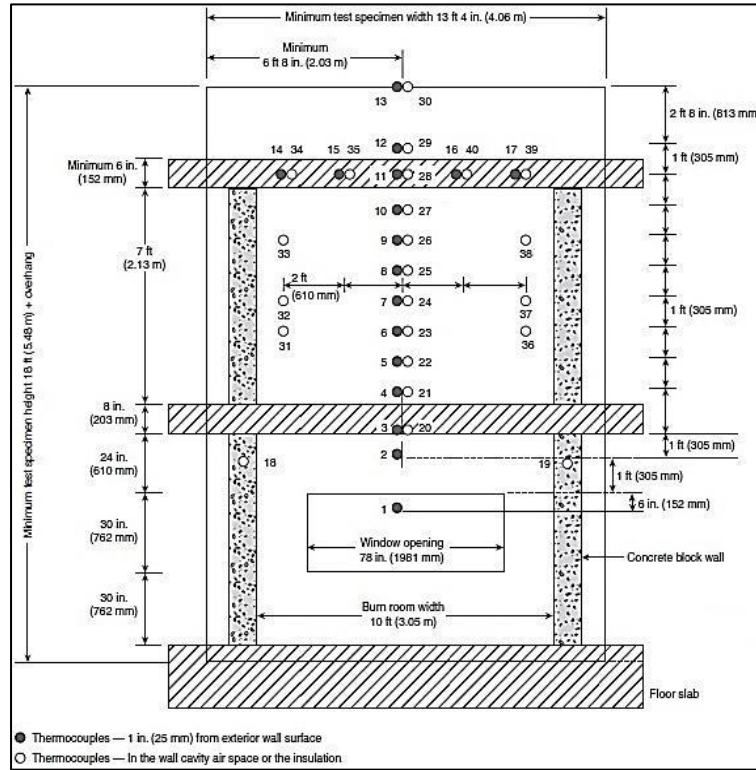


Figure 1: Overall instrumentation on the exterior wall surface and air cavity.

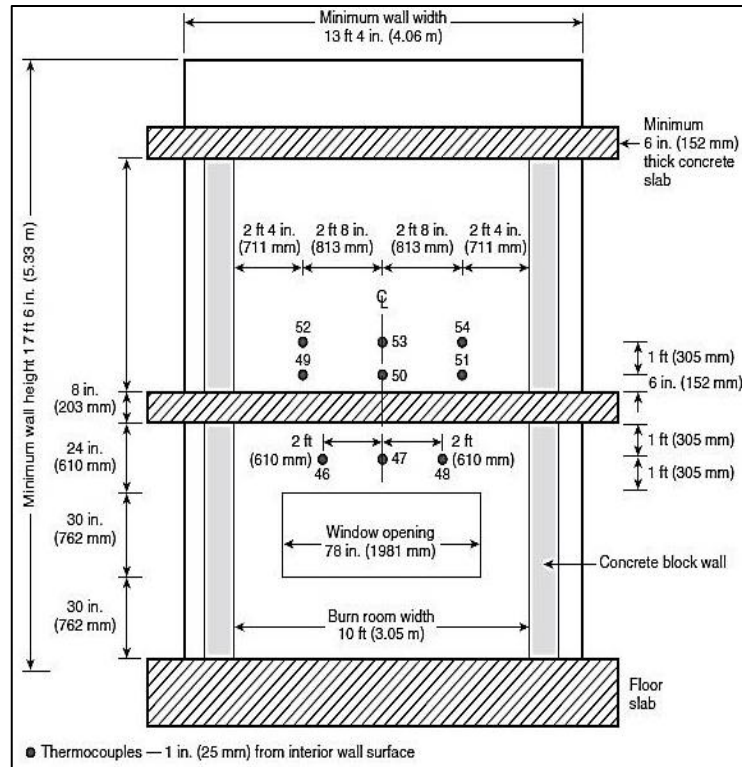


Figure 2: Overall instrumentation on the interior wall

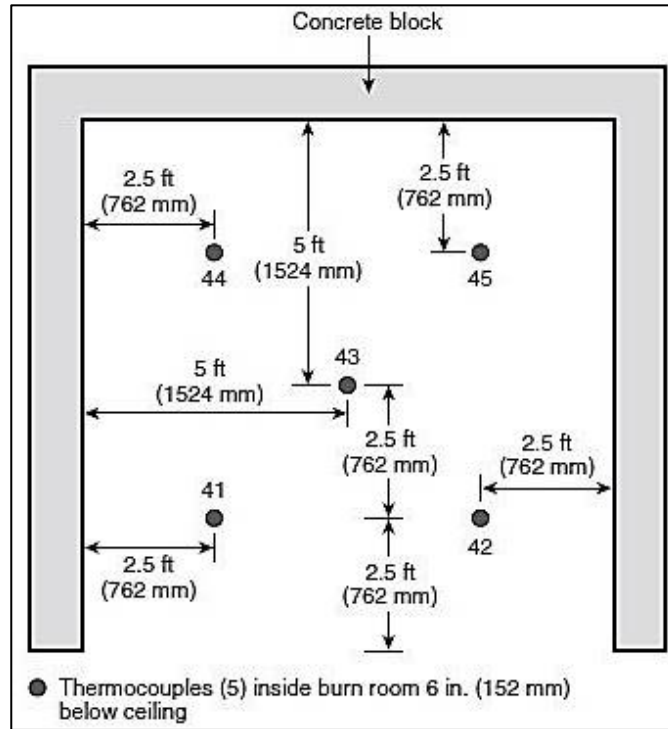


Figure 3: Overall instrumentation inside of the 1st story burn room (Top View)

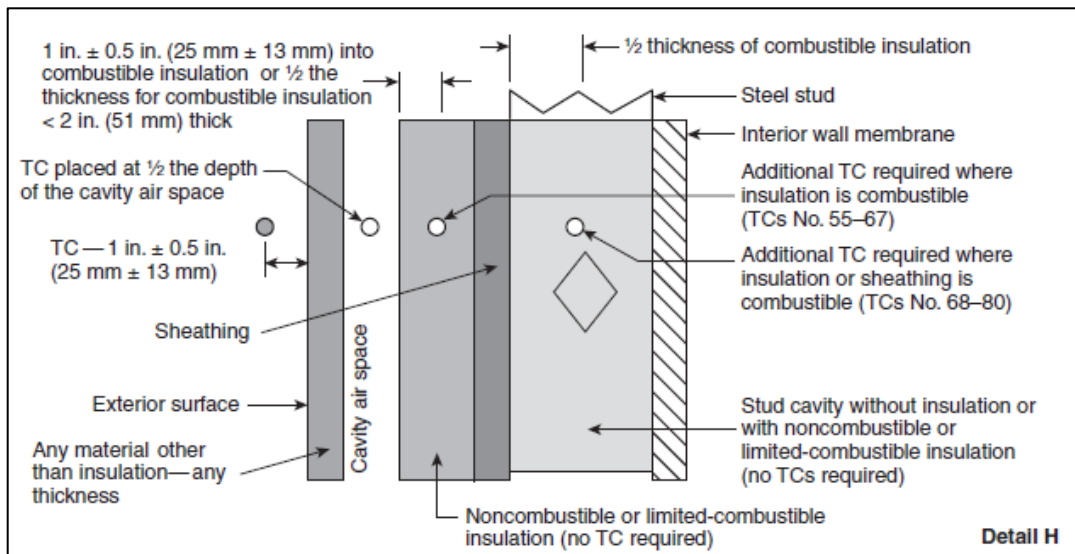


Figure 4: Figure 6.1(b) Detail H of the NFPA 285 standard, showing the thermocouple depth specifications of the specimen.



14. APPENDIX 2 – CALIBRATION & BURNER GAS FLOW DATA

The calibration for the test rig was performed on 16th July, 2020 and followed the procedure and practices outlined for calibration in NFPA 285:2019, Chapter 7.

Table 1 shows gas flow values during the test and during the calibration, table 2 shows the average heat flux, and table 3 shows the average temperature obtained during the calibration test. The values are within the allowable ranges as specified in table 7.1.11 ($\pm 10\%$ allowable tolerance). The flowmeters used in the test were externally calibrated using air as a medium, and SCFM values shown below have been converted from SCFM Air to SCFM Natural Gas using a scaling factor of 1.25 LPM of Natural Gas for every 1 LPM of Air.

Time	During Fire Test		During Calibration	
	Room Burner	Window Burner	Room Burner	Window Burner
0 – 5 mins	26.4 SCFM	0.0 SCFM	26.4 SCFM	0.0 SCFM
5 – 10 mins	30.8 SCFM	5.5 SCFM	30.8 SCFM	5.5 SCFM
10 – 15 mins	33.0 SCFM	6.0 SCFM	33.0 SCFM	6.0 SCFM
15 – 20 mins	35.2 SCFM	7.0 SCFM	35.2 SCFM	7.0 SCFM
20 – 25 mins	37.4 SCFM	8.0 SCFM	37.4 SCFM	8.0 SCFM
25 – 30 mins	39.6 SCFM	8.5 SCFM	39.6 SCFM	8.5 SCFM

*SCFM: Standard Cubic Feet per Minute

Time Interval (min)	Average Heat Flux 2FT (W/cm ²)	Average Heat Flux 3FT (W/cm ²)	Average Heat Flux 4FT (W/cm ²)
0:00-5:00	0.89	1.03	0.86
5:00-10:00	2.84*	2.01	1.87*
10:00-15:00	3.02*	2.29	1.99
15:00-20:00	3.39	2.68	2.13
20:00-25:00	3.93	3.09	2.57
25:00-30:00	4.62*	3.41	2.74

Time Interval (min)	Avg. Burn Room Temp (°F)	Avg. Int. Wall Temp (°F)	Avg. 1 FT Temp (°F)	Avg. 2 FT Temp (°F)	Avg. 3 FT Temp (°F)	Avg. 4 FT Temp (°F)	Avg. 5 FT Temp (°F)	Avg. 6 FT Temp (°F)
0:00-5:00	604.0	656.6	588.4	617.2	517.3	487.5	1029.3	1036.8
5:00-10:00	945.9	954.4	907.0	934.0	771.2	784.7	1364.2	1313.8
10:00-15:00	1023.0	1011.3	998.1	971.1	822.4	845.6	1517.4	1445.4
15:00-20:00	1104.2	1065.9	1058.0	984.8	880.3	899.5	1687.7	1574.2
20:00-25:00	1196.0	1146.6	1122.4	1030.6	943.0	950.3	1815.7	1664.0
25:00-30:00	1315.5*	1266.5	1202.8	1194.5	1021.9	993.7	1897.4	1723.7

Note: Values indicated with an "*" were values which were nominally in excess of the values stated in the calibration.



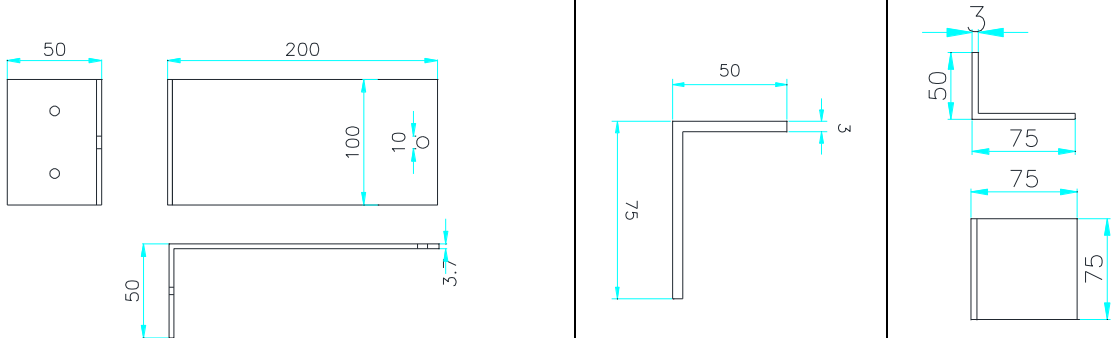
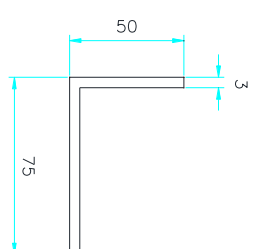
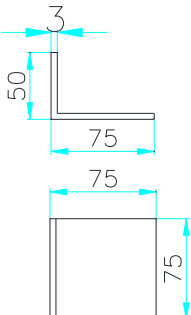
15. APPENDIX 3 – COMPONENTS DESCRIPTION

Note: All information provided herein Appendix 3 has been provided either by TBWIC or Test Sponsor. Information marked with a single asterisk indicates information provided by the Test Sponsor which has been checked against the materials used in the test where appropriate, however does not fall under the responsibility of TBWIC. All dimensions are expressed in millimetres (mm), unless otherwise specified.

A. Base Wall:

Basewall Components				
	Stud and Track	Wall Lining	Tape	Jointing Compound
Material	Galvanized Steel	N/A	N/A	N/A
Manufacturer	JB Mechanical Services	Knauf LLC	Knauf LLC	Knauf LLC
Reference	N/A	15.9mm Type X (GW-TX)	Knauf Joint Tape	Knauf Readygips
Dimension	As Shown Cut to Required Length	1220 x 2400 x 15.9mm (w x h x thk.)	50mm wide	N/A
Fixing method & Application	<p>The gypsum base wall was built and provided by the laboratory as a substrate wall for which to install the system on, and is not a part of the sponsors tested system, but is represented in this component description for continuity of detail and as required by the testing standard. It does not lend itself to a particular type of fire rating, but is also understood to not contribute to or diminish the performance of the tested specimen.</p> <p>Studs were fixed at edge of the wall span and nominally spaced to match the distribution of the Aluminium wall brackets (see drawings in Appendix 4). The top and bottom edges were welded within tracks at the head and sill of the base wall and also around the window opening. Both were welded directly to the standardized test frame at appropriate locations.</p> <p>The boards were fixed with Knauf TB Ø3.5 x 35mm self-tapping screws, spaced nominally at 300mm C/C vertically on each stud. Jointing compound was applied along all exterior meeting edges of the boards, with ample drying time and single strips of jointing tape embedded within the first layer of jointing compound.</p> <p>The jointing compound was also applied over all exposed screw heads.</p>			

**B. Aluminium Composite Panel Cladding Assembly:
Framing System**

Framing Components			
 <p>Aluminium Wall Bracket</p>	 <p>Runner Profiles</p>	 <p>Runner connector</p>	
	Aluminium Wall Bracket	Runner Profiles	Runner connector
Material	Aluminium* (AA-6063/T6) *	Aluminium * (AA-6063/T6) *	Aluminium * (AA-6063/T6) *
Manufacturer	National Aluminium Extrusion Co. LLC*	National Aluminium Extrusion Co. LLC*	National Aluminium Extrusion Co. LLC*
Dimension	As shown above	As shown above/Cut into required lengths	As shown above
Fixing Method & Application	<p>Aluminum wall brackets were fixed to studs of the base wall through the exterior Gypsum lining using two numbers of Ø6x50mm hex head self-drilling screw with washer. Refer to Appendix 4, Drawing 2 for spacing of brackets. Wall brackets supported the Aluminium runner profiles, which were fixed to them using Ø6x25mm hex head self-drilling screw with washer. Refer to Appendix 4, Drawing 3 for spacing of runner profiles. The horizontal and vertical runners were connected to each other at intersections using Aluminium runner connectors and Ø4x19mm countersunk self-tapping screws.</p>		

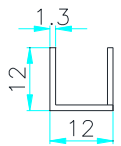
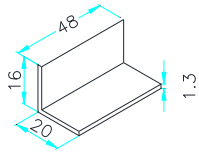
Cavity Insulation & Fasteners			
	Insulation	Fasteners	Foil Tape 1
Manufacturer	KIMMCO ISOVER	ULTRA*	AIPL Tapes Industry LLC
Material	Stone wool with Aluminum FS facing on one side.	Galvanized Steel	Aluminium Foil Tape
Reference	Comfort SA Slab 50 FS	ULTRA Metal Insulation Plug*	AIPL ZORRO FIX
Density	50kg/m ³ (stated)* 50.5kg/m ³ (Measured)	N/A	N/A
Dimensions	Max: 1200 x 600 x 50mm (l x w x thk.)	Ø9 x 110mm	95mm wide
Fixing Method & Application	<p>A single layer of 50mm thick insulation was installed on the entire exterior face of the base wall, in between the Aluminium wall brackets and runners except for the locations of the cavity fire barriers. Each full-size slab was fixed</p>		



	using 5 Nos. of galvanized steel pins $\varnothing 9 \times 110 \text{mm}$ distributed in equal spacing between them. The pins and all meeting edges were covered with Aluminium foil tape.
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Cavity Fire Barrier & Fasteners				
	Horizontal Cavity Barrier	Vertical Cavity Barrier	Cavity Fire Barrier brackets	Foil Tape 2
Material	Pre-Compressed Mineral Wool*	Pre-Compressed Mineral Wool*	Galvanized Steel*	N/A
Manufacturer	Siderise Group*	Siderise Group*	Siderise Group*	Siderise Group*
Reference	CH-CB constructed from CW-FS120*	CH-CB constructed from CW-FS120*	B195*	RFT 120/45*
Dimensions	120 x 256mm X1200mm (thk x depth x length)	120 x 256mm X1200mm (thk x depth x length)	320 x 25 x 1mm (l x w x thk unbent)	120mm Wide
Density	75kg/m ³ (Stated) 74.3kg/m ³ (Measured)	75kg/m ³ (Stated) 74.3kg/m ³ (Measured)	N/A	N/A
Fixing Method & Application	<p>The horizontal and vertical cavity fire barriers were cut from 1100 x 1200 x 120mm (l x w x thk.) pre-compressed mineral wool slabs and made into 120 x 256 x 1200mm barriers. The slabs were cut to a depth of 256mm in consideration of a designed cavity depth of 196mm from base wall to interior cladding rear face, such that they would be compressed between the base wall and the interior face of the panel system nominally by 10mm. All meeting edges and termination of the cavity fire barrier were covered with 120mm wide Siderise foil tape.</p> <p>The horizontal cavity fire barriers were fixed at the heights of the floor slabs and at the window head termination, as shown in drawing 4 in Appendix 4. The vertical fire cavity barriers were fixed at an offset of 40mm from the vertical edges of the window opening and they extended from bottom to top of the base wall. First, the cavity barrier fixings were bent into an L-shape, then the longer edge of the bracket impaled the cavity barrier, and the shorter edge of the bracket was fixed onto the base wall using $\varnothing 4.6 \times 35 \text{mm}$ sheet metal self-drilling screws and metal plugs. The fire barrier slabs were shortened lengths wise to fit between the runner profiles. The brackets were fixed nominally at 600mm centre to centre distance.</p>			



Exterior Cladding & Support Hardware				
 <p>Aluminium U-profile</p>		 <p>Aluminium Angle cleat</p>		
	Panel Material	Angle Cleat	U- profile	Sealant
Material	4mm thick Aluminium Composite Panel	Aluminium (AA-6063/T6) *	Aluminium (AA-6063/T6) *	Silicone*
Manufacturer	International Development Company Metal Industries - Sole Proprietorship L.L.C.	National Aluminium Extrusion Co. LLC*	National Aluminium Extrusion Co. LLC*	DOW®
Reference	ALUCLAD A2	Retail*	Retail*	Firestop 700 Black
Dimensions	As shown below	As shown above	As shown above	N/A
Dimension	Panel Reference		Module Dimensions (w x h) in mm	Quantity
	01		1940x1108	1
	02		1940x 1108	1
	03		935x990	4
	04		985x990	4
	05		935x739	2
	06		985x739	2
	07		957x727	2
	08		935x846	2
	09		994x846	2
	10		280x2352	2
11		283x3128	2	
Fixing Method & Application	<p>The 4mm thick panels arrived at the laboratory as pre-bended tray profile units with Aluminium angle cleats fixed within the bend of the profiles using two Ø4 x 18mm rivets for each cleat. The bend of the tray profiles had an internal depth of 16mm, and a total depth of 20mm for each panel module.</p> <p>The cleats ultimately supported the panels on the runners using Ø4 x 19mm pan head screws, and were set on edges of the panels. The maximum C/C spacing between the cleats were 350mm and a maximum of 150mm was from the corner of the panel module. The modules with return bend were reinforced with a piece of L-Shaped ACP and using Ø4 x 18mm Aluminium blind rivets. The modules with return bend surrounding the window opening</p>			



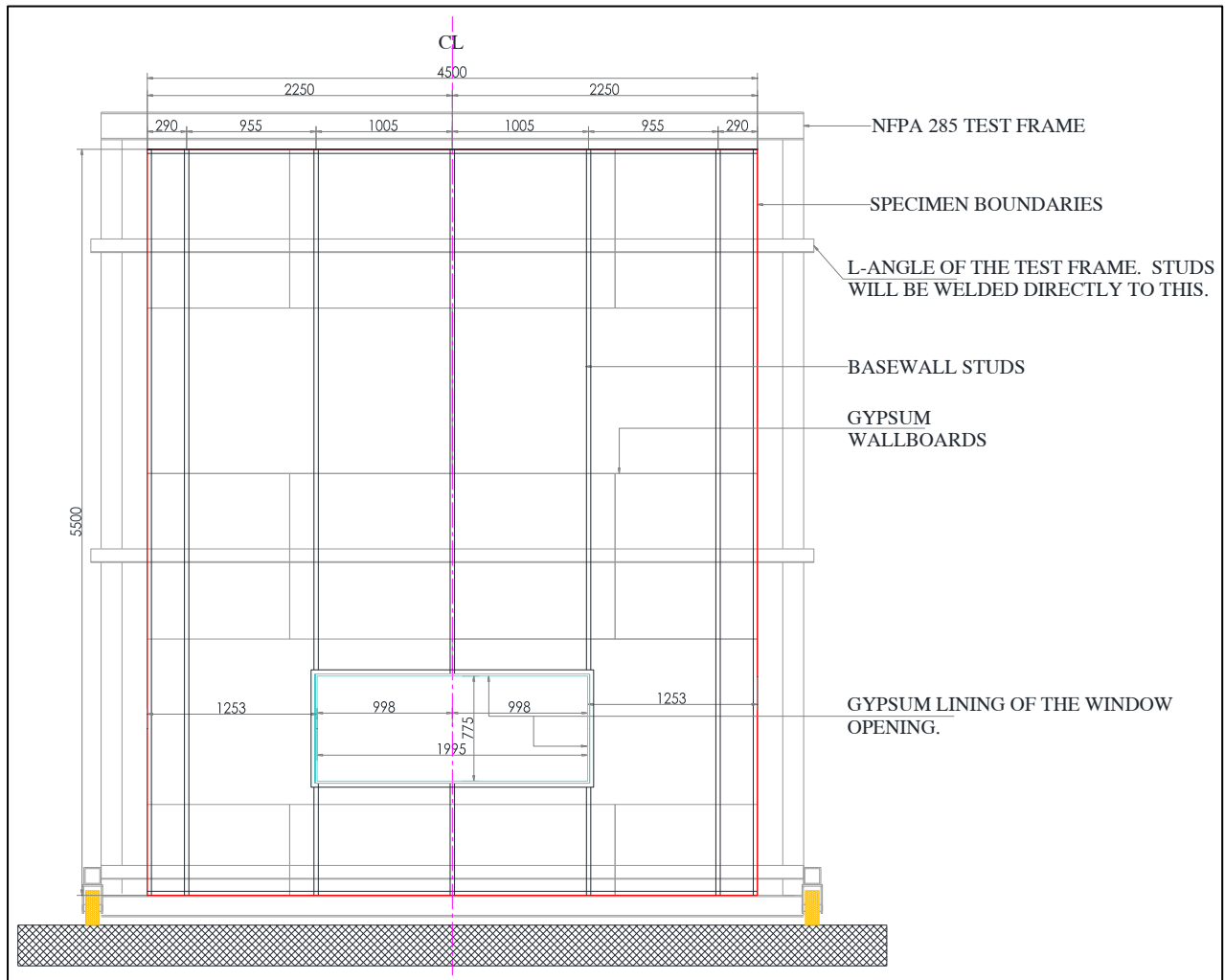
	<p>were reinforced with Aluminium L-angles of 75 x 50 x 50 mm dimension cut from the runner profile and were fixed using Silicone sealant.</p> <p>A nominal gap of 20mm was maintained both horizontally and vertically between adjacent panel modules. Aluminium U-profiles were inserted along the panels gaps and was screw fixed using $\varnothing 4$ x 25mm pan head screws at 400mm nominal c/c spacing. Sealant was applied between the joint gaps, extruded smoothly and made flush with the exterior face of the specimen.</p>
External Cavity Dimensions	<p>A total gap of 246mm existed between the exterior face of the base wall and the interior face of the panels, and a total air cavity of 196mm existed between the cavity insulation and the interior face of the panels.</p>

Perimeter Termination Detail	
Manufacturer	International Development Company Metal Industries - Sole Proprietorship L.L.C.
Reference	ALUCLAD A2 Aluminium Composite Panel.
Material	4mm (Measured)
Fixing Method & Application	The bent sections of ACPs were overlapped into perimeterwall on the terminations. The overlapping edge was fixed $\varnothing 4.5$ X 35mm wafer head self-drilling screws at a spacing of nominal 400mm c/c.

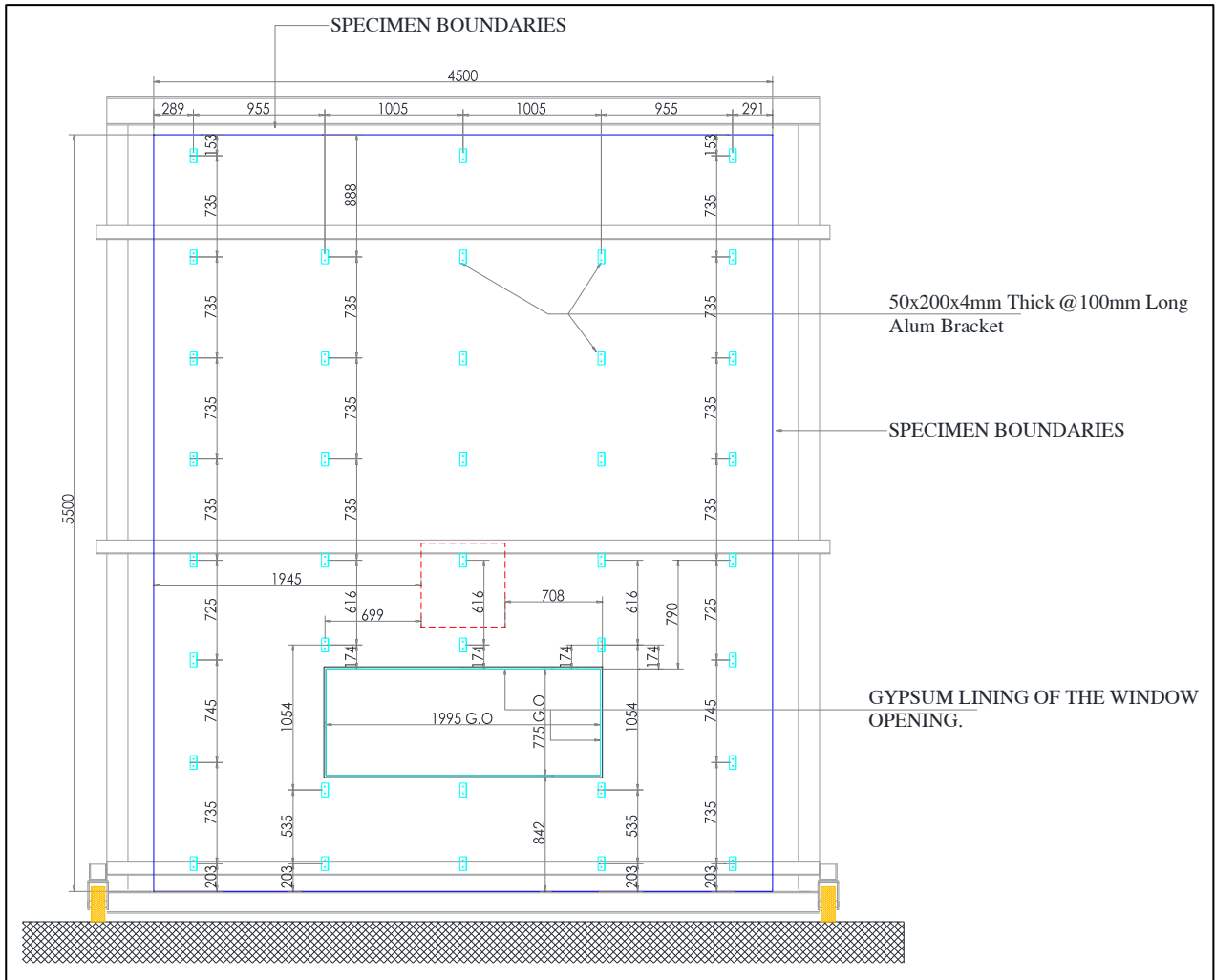
Window Termination Detail	
Material	Aluminium Composite panel
Manufacturer	International Development Company Metal Industries - Sole Proprietorship L.L.C.
Reference	ALUCLAD A2 Aluminium Composite Panel
Thickness	4mm (Measured)
Fixing Method & Application	The window header, jambs, and sill were covered with ALUCLAD A2 Aluminium Composite Panel which was bent till the exterior face of the base wall. The return bend was fastened with $\varnothing 4.5$ X 35mm pan head screws at a spacing of 152mm.



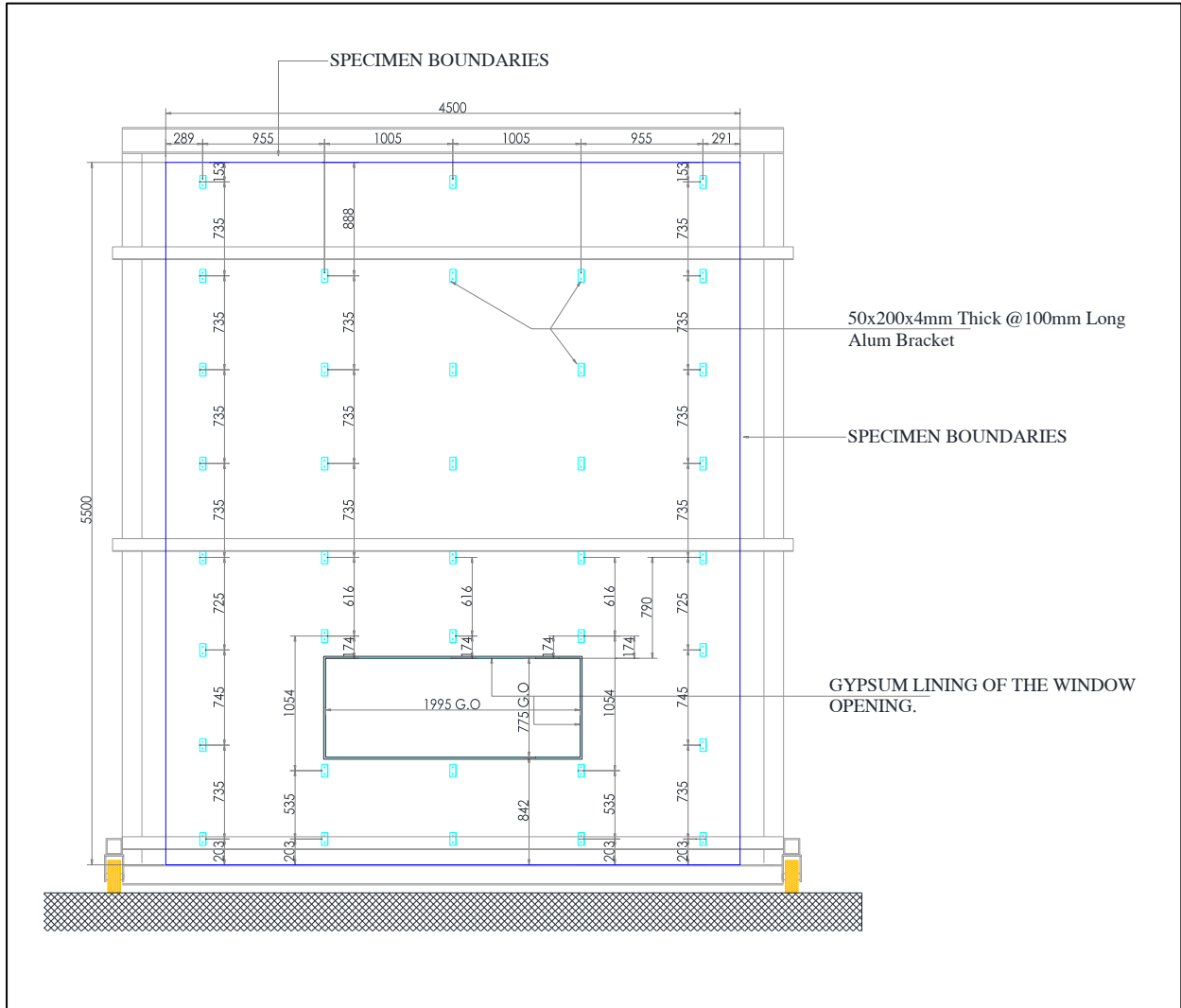
16. APPENDIX 4 – ASSEMBLY DRAWINGS



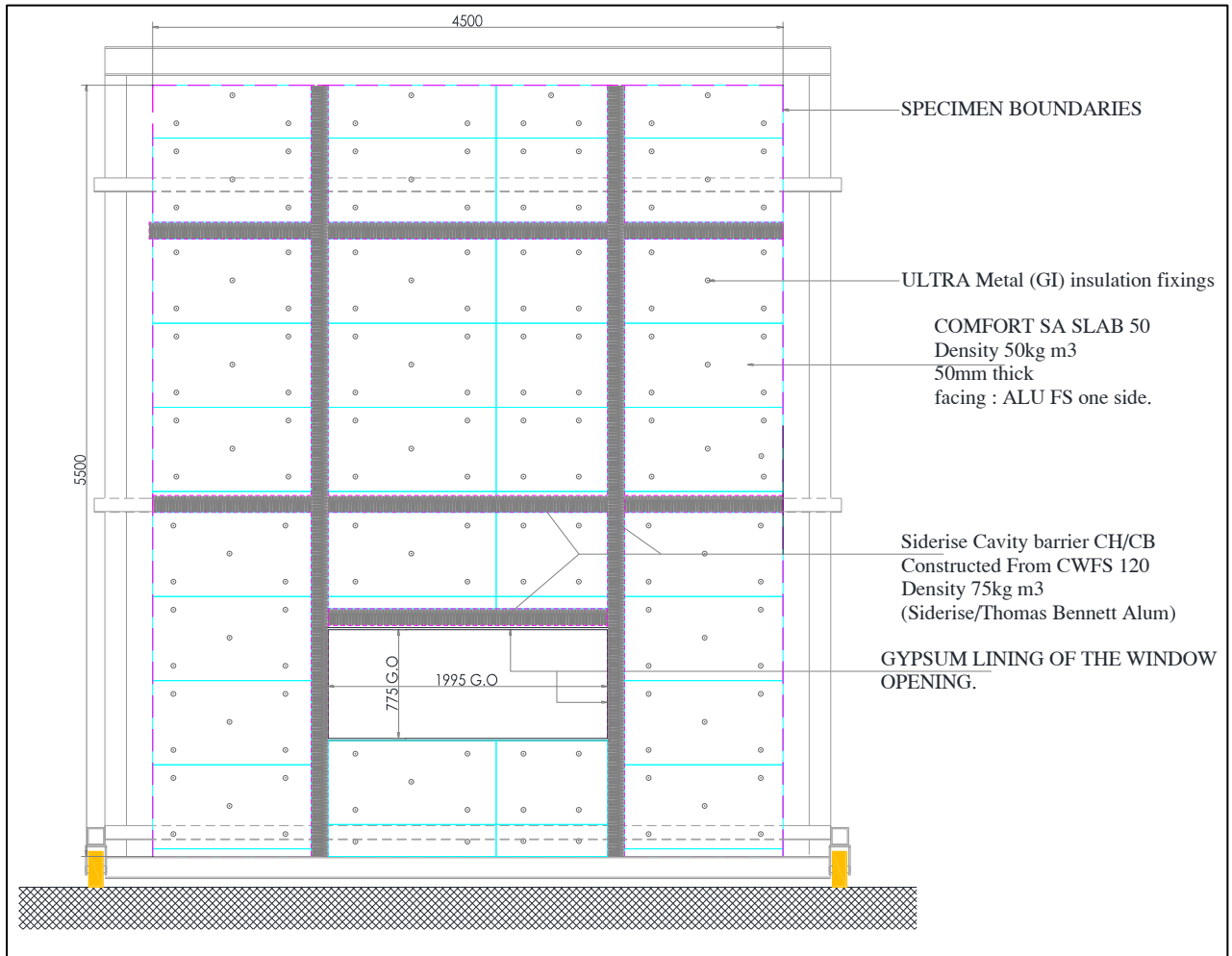
Drawing 1: An elevation view of the base wall stud locations.
(Drawing provided by the test sponsor).



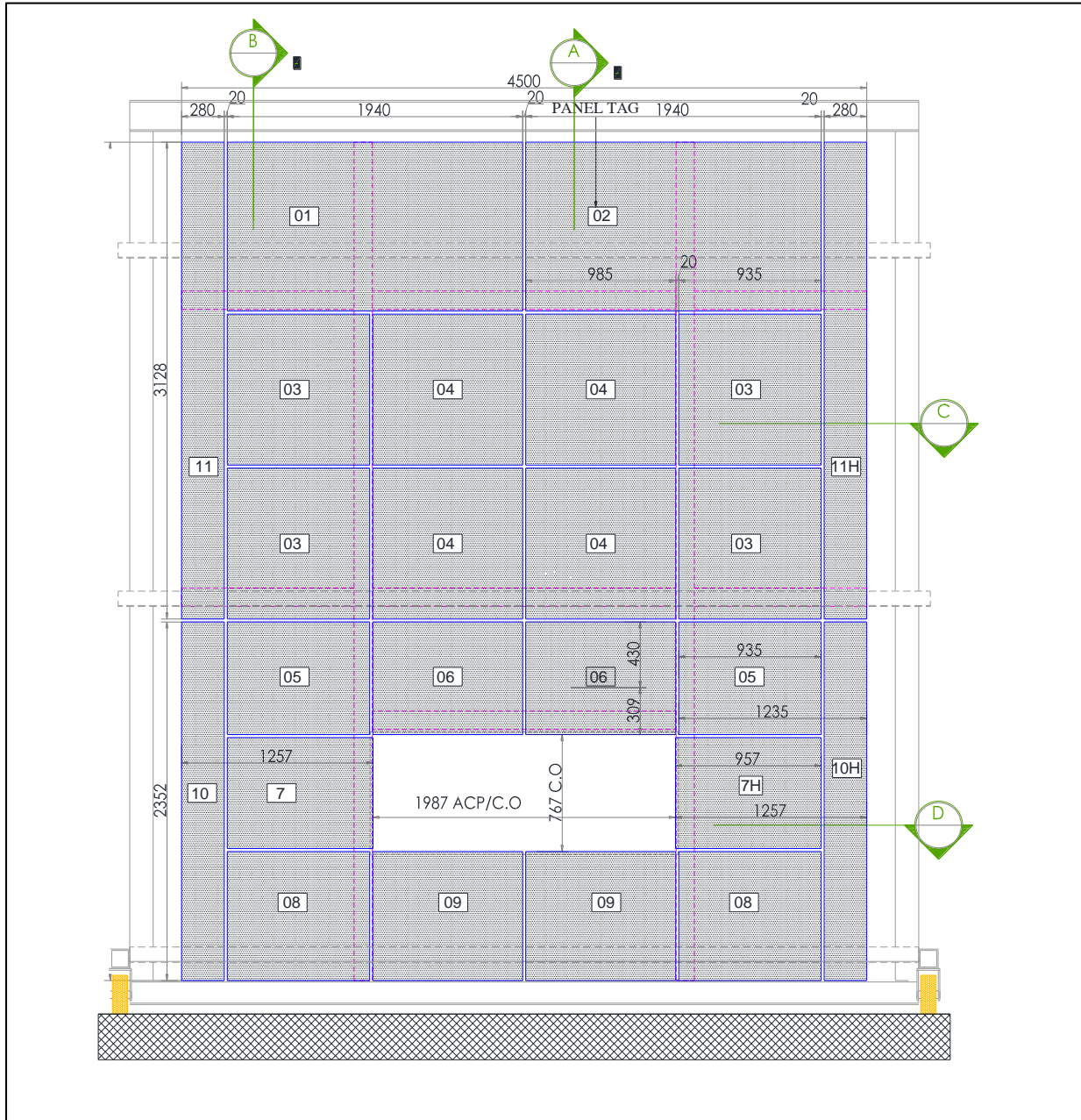
Drawing 2: Elevation view of the bracket locations.
(Drawing provided by the test sponsor).



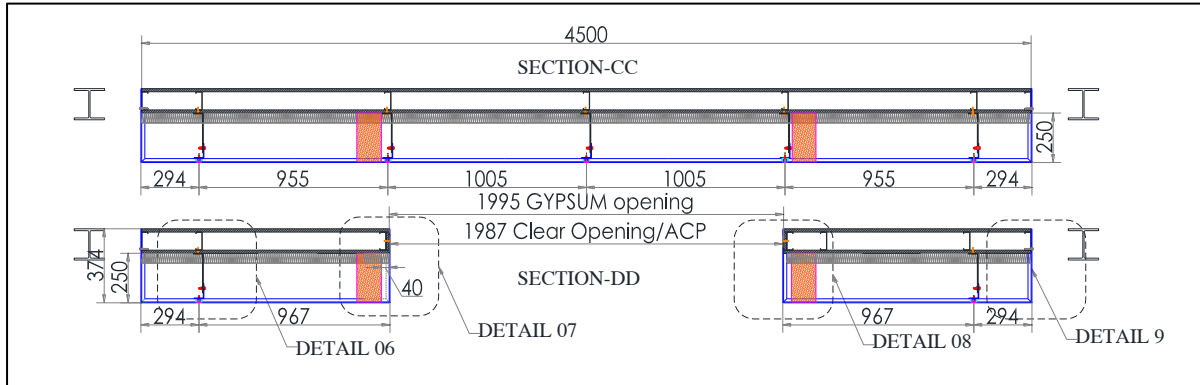
Drawing 3: Elevation view of the horizontal and vertical runner profile.
(Drawing provided by the test sponsor).



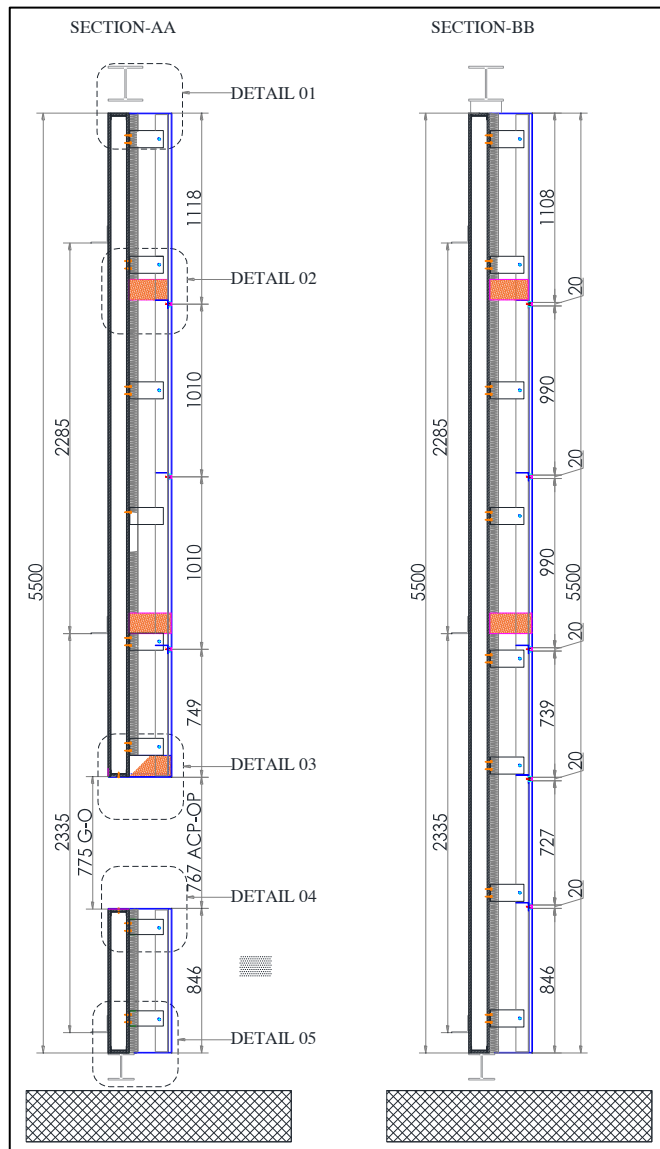
Drawing 4: Elevation view of the Horizontal Cavity Barriers, vertical cavity barriers and external insulation assembly.



Drawing 5: Elevation view of actual design layout of panels
(Drawing provided by the test sponsor).



Drawing 6: Horizontal section views of the specimen at the window height and an intermediate height. (Drawing provided by the test sponsor).



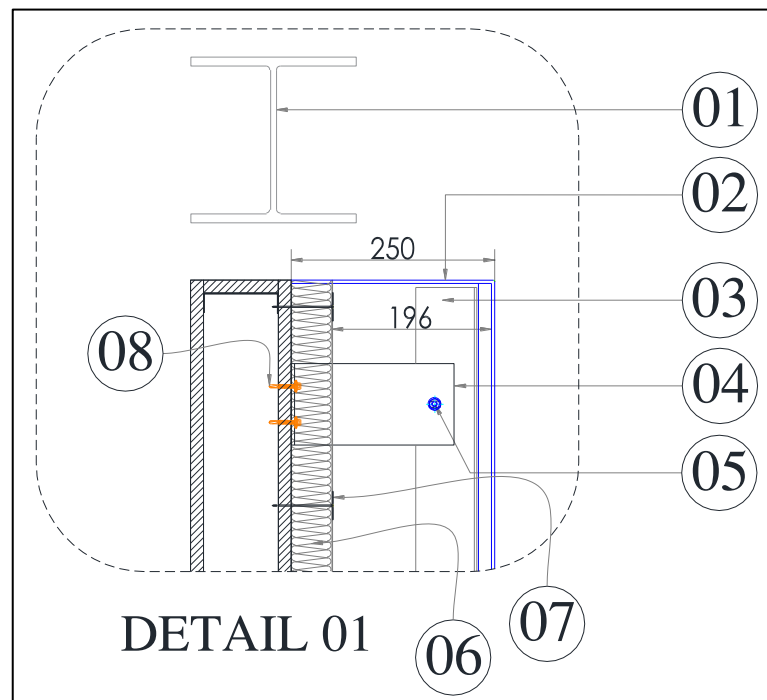
Drawing 7: Vertical sectional view of the cladding system at window width and intermediate width. (Drawing provided by the test sponsor).



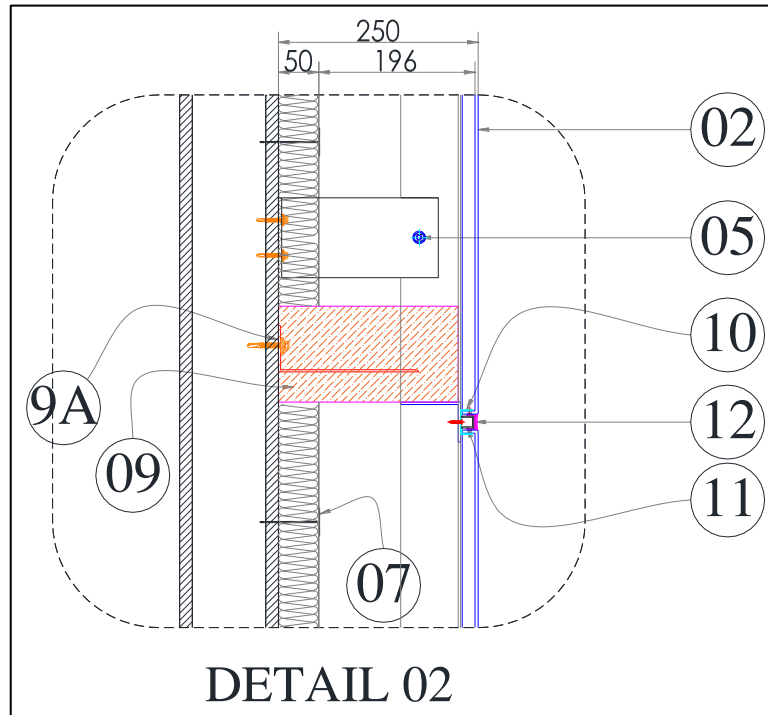
DRAWING LEGEND:

1. NFPA-285 Test Frame
2. 4mm Thick Aluclad A2 ACP
3. 75x50x3mm Thk Alum Runner (Vertical/Horizontal)
4. 50x200x3.7mm Thick Alum Brkt (@100mm Long)
5. 6x25mm Long Hex head Screw
6. COMFORT SA SLAB 50 -one side Alum FS (50mm thick 50kg m³ Density)
7. ULTRA Metal (GI) Insulation Fixings
8. 6x50mm Long Hex head Self drilling screw.
09. Siderise Cavity barrier CH/CB Constructed From CWFS 120 (75kg m³ Density)
- 9A. Bracket for Siderise Cavity barrier
10. 16x20x1.3mm Thk Alum Cleat @48mm long
11. 12x12x1.3mm Thk Alum U Channel (Vert/Horz)
12. Dow Firestop 700 Black(Sealant)

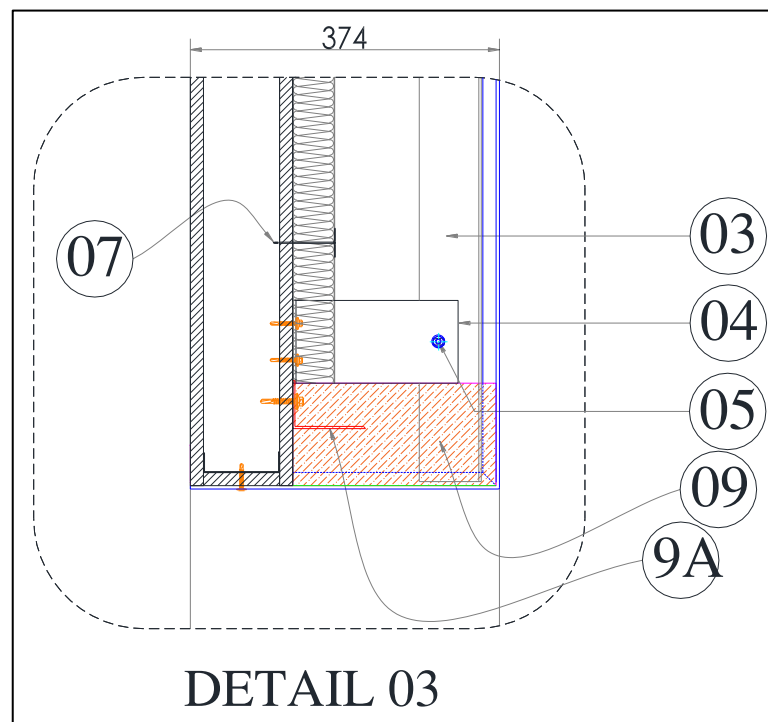
Drawing 8: Legends used in the detailed drawings.
(Drawing provided by the test sponsor).



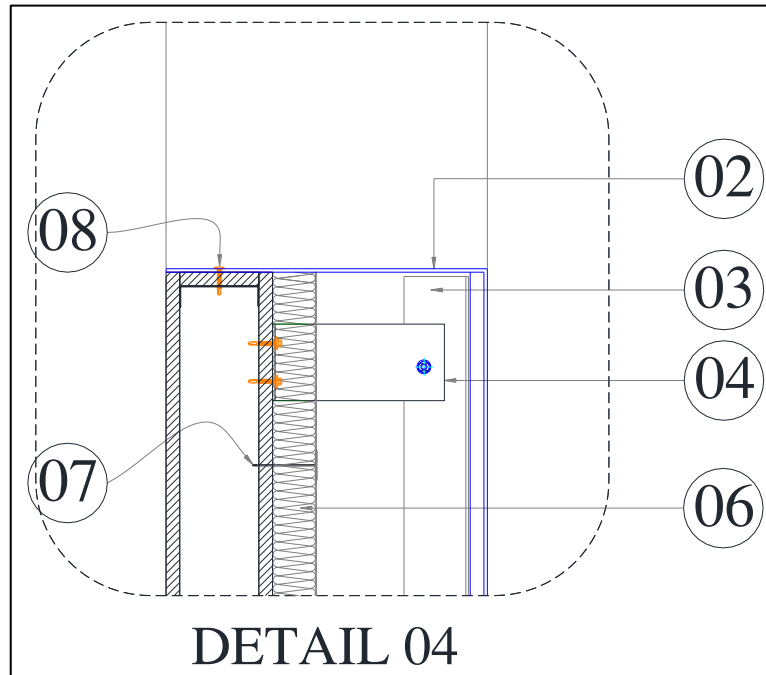
Drawing 9: Detail 1 of the Specimen.
(Drawing provided by the test sponsor).



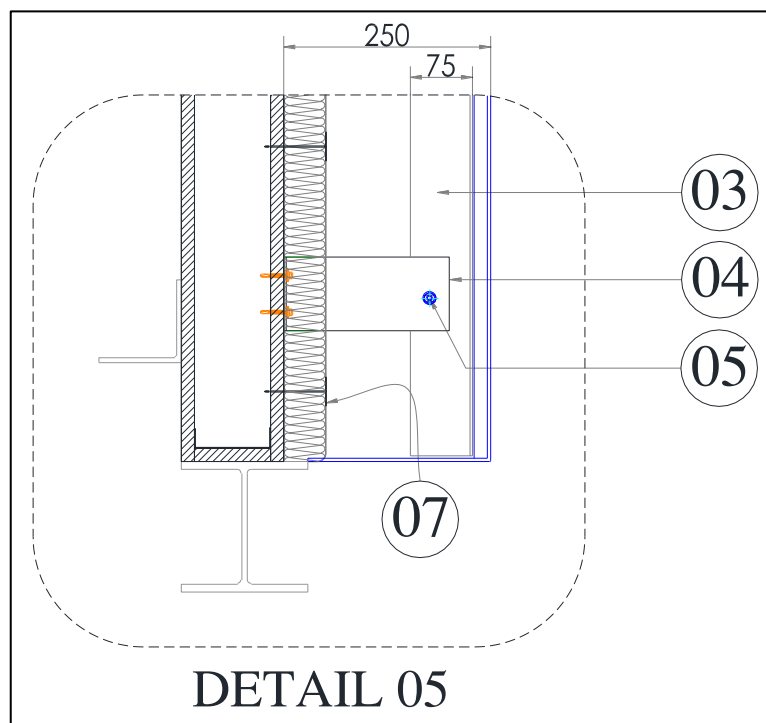
Drawing 10: Detail 2 of the Specimen.
(Drawing provided by the test sponsor).



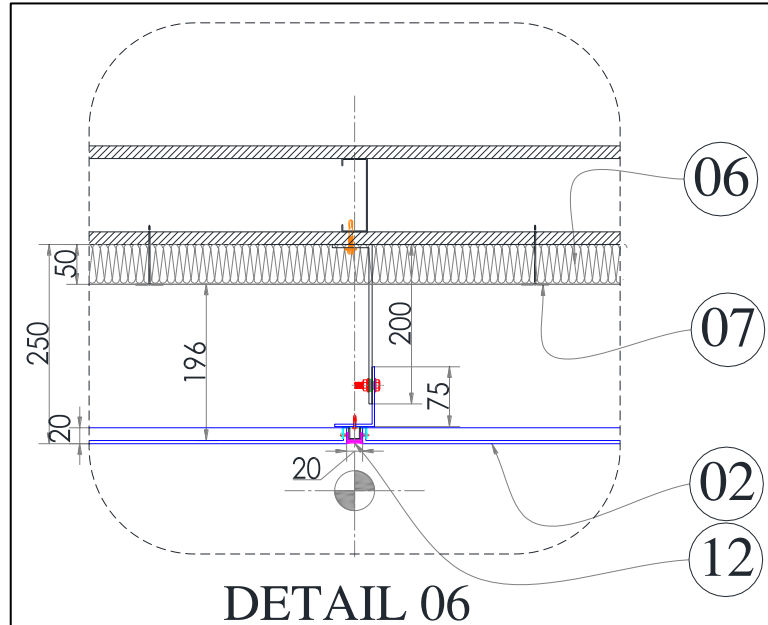
Drawing 11: Detail 3 of the Specimen.
(Drawing provided by the test sponsor).



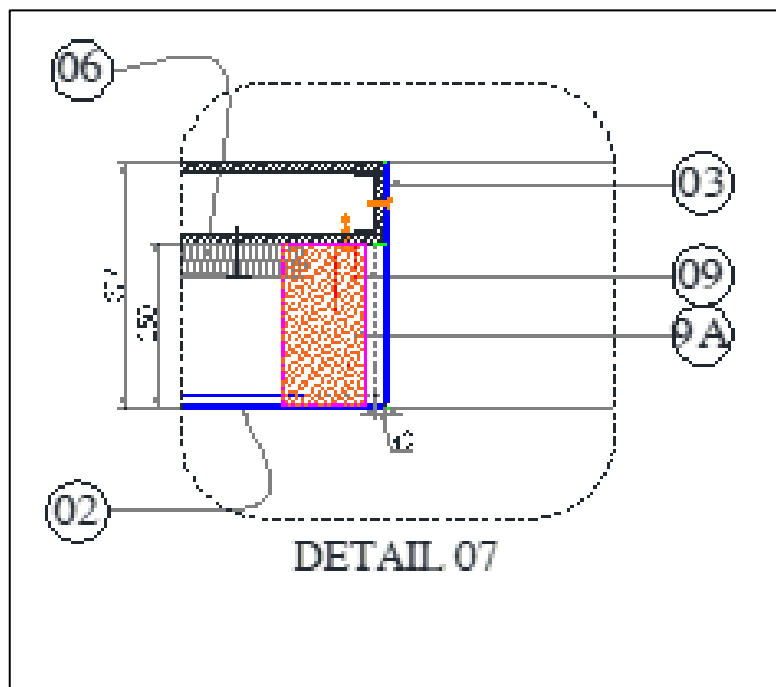
Drawing 12: Detail 4 of the Specimen.
(Drawing provided by the test sponsor).



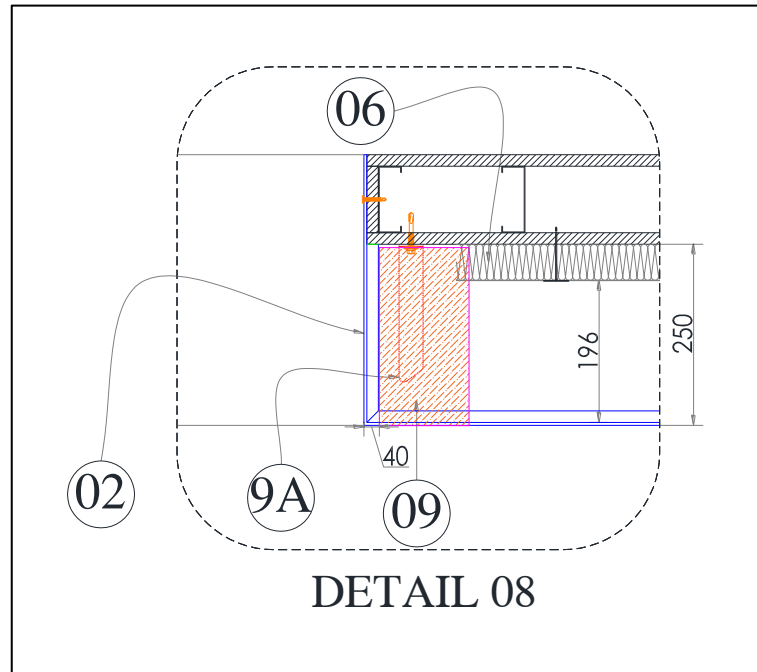
Drawing 13: Detail 5 of the Specimen.
(Drawing provided by the test sponsor).



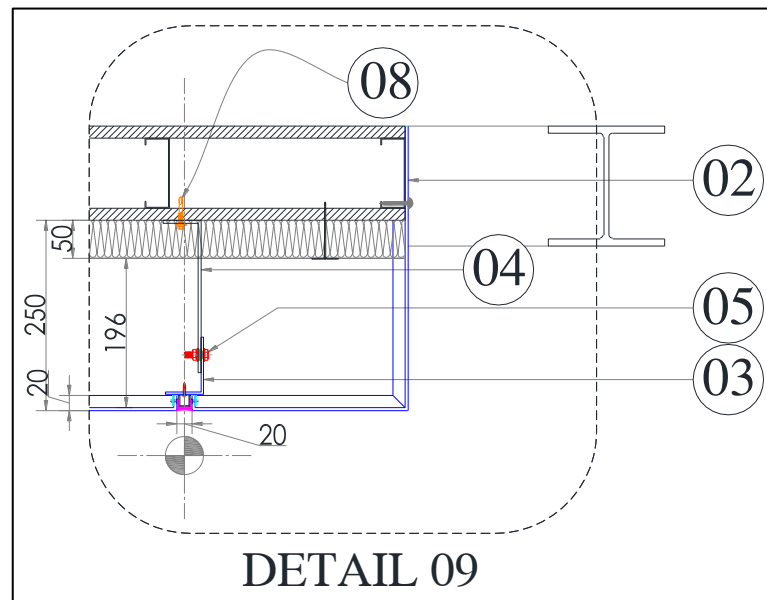
Drawing 14: Detail 6 of the Specimen.
(Drawing provided by the test sponsor).



Drawing 15: Detail 7 of the Specimen.
(Drawing provided by the test sponsor).



Drawing 16: Detail 8 of the Specimen.
(Drawing provided by the test sponsor).



Drawing 17: Detail 9 of the Specimen.
(Drawing provided by the test sponsor).



17. APPENDIX 5 – THERMOCOUPLE DATA

Time (min:sec)	Tc 1 (°F)	Tc 2 (°F)	Tc 3 (°F)	Tc 4 (°F)	Tc 5 (°F)	Tc 6 (°F)	Tc 7 (°F)	Tc 8 (°F)	Tc 9 (°F)
0:00	74	74	74	74	73	73	74	74	74
0:15	271	177	222	226	239	202	206	187	176
0:30	531	366	415	361	394	312	296	269	247
0:45	637	444	502	423	466	376	347	314	292
1:00	675	490	540	450	490	406	378	346	320
1:15	691	515	552	454	496	419	386	353	330
1:30	716	544	575	475	515	433	395	359	334
1:45	768	568	592	492	538	452	412	376	348
2:00	783	570	596	479	531	442	400	363	339
2:15	816	581	611	491	543	452	419	380	356
2:30	808	593	621	505	555	460	416	376	350
2:45	822	599	632	517	569	475	435	389	363
3:00	831	613	636	519	564	477	436	388	359
3:15	825	617	641	521	566	484	450	403	376
3:30	842	612	627	505	552	468	429	390	365
3:45	853	630	647	527	576	493	461	391	385
4:00	854	641	651	528	578	493	459	388	380
4:15	858	641	657	543	590	502	460	390	389
4:30	865	651	671	550	602	508	460	393	385
4:45	869	654	670	551	604	508	458	394	385
5:00	874	665	683	564	610	524	478	410	398
5:15	981	745	790	677	731	626	580	513	482
5:30	1038	833	881	770	818	715	664	583	542
5:45	1075	900	942	813	862	749	680	596	544
6:00	1106	957	994	843	907	775	706	622	567
6:15	1127	982	1018	873	929	812	748	662	610
6:30	1121	1001	1033	878	934	805	733	649	602
6:45	1135	1034	1047	885	941	817	754	667	621
7:00	1141	1035	1046	898	941	831	777	690	634
7:15	1153	1047	1056	896	945	833	768	684	626
7:30	1161	1057	1064	903	951	826	753	672	616
7:45	1151	1074	1072	915	958	842	775	684	626
8:00	1156	1086	1073	916	954	843	770	681	633
8:15	1156	1091	1077	923	963	860	791	696	640
8:30	1151	1098	1085	920	961	854	782	688	633
8:45	1158	1109	1090	929	964	868	805	711	652
9:00	1152	1113	1086	930	963	869	801	711	657
9:15	1169	1115	1095	932	966	873	812	724	674
9:30	1169	1127	1108	940	979	879	807	722	667
9:45	1164	1137	1099	927	966	875	802	720	659



Time (min:sec)	Tc 1 (°F)	Tc 2 (°F)	Tc 3 (°F)	Tc 4 (°F)	Tc 5 (°F)	Tc 6 (°F)	Tc 7 (°F)	Tc 8 (°F)	Tc 9 (°F)
10:00	1183	1161	1123	954	989	899	829	742	676
10:15	1204	1182	1145	965	1001	909	827	740	682
10:30	1219	1207	1162	999	1023	941	865	778	722
10:45	1237	1224	1173	995	1029	929	842	757	694
11:00	1229	1260	1184	1001	1037	933	852	769	706
11:15	1237	1326	1224	1021	1064	935	838	753	691
11:30	1260	1441	1318	1093	1121	994	880	783	711
11:45	1251	1443	1360	1094	1126	1003	897	802	730
12:00	1215	1465	1365	1108	1147	1014	904	810	736
12:15	1242	1432	1392	1126	1168	1023	905	802	724
12:30	1268	1419	1394	1121	1162	1024	904	806	724
12:45	1252	1441	1397	1109	1154	1019	899	790	707
13:00	1252	1451	1400	1122	1171	1045	938	832	757
13:15	1279	1456	1413	1151	1192	1073	944	835	753
13:30	1258	1444	1393	1148	1199	1065	939	834	752
13:45	1267	1437	1377	1143	1187	1071	963	863	782
14:00	1311	1449	1368	1124	1186	1043	932	831	754
14:15	1299	1408	1365	1115	1168	1048	938	838	761
14:30	1306	1429	1356	1118	1172	1040	929	825	748
14:45	1330	1368	1321	1095	1144	1016	915	815	748
15:00	1359	1306	1280	1076	1130	999	903	809	746
15:15	1371	1365	1329	1119	1135	1030	933	835	770
15:30	1378	1332	1316	1110	1112	1023	933	838	769
15:45	1394	1329	1317	1095	1096	1010	922	824	753
16:00	1403	1336	1343	1118	1128	1033	950	848	773
16:15	1410	1347	1346	1126	1136	1038	944	845	767
16:30	1402	1350	1354	1134	1143	1050	958	864	795
16:45	1410	1361	1341	1127	1152	1043	952	869	796
17:00	1420	1356	1349	1132	1128	1047	955	870	793
17:15	1429	1362	1354	1141	1144	1068	980	894	821
17:30	1443	1372	1352	1131	1132	1053	963	875	801
17:45	1386	1364	1358	1147	1157	1077	1039	937	842
18:00	1419	1365	1354	1134	1147	1058	993	893	801
18:15	1412	1378	1365	1149	1159	1072	1013	920	822
18:30	1436	1375	1350	1136	1178	1064	979	896	812
18:45	1444	1369	1339	1113	1124	1046	964	876	791
19:00	1441	1372	1341	1116	1137	1049	974	885	800
19:15	1434	1357	1323	1105	1170	1036	957	865	782
19:30	1418	1347	1306	1097	1126	1032	955	870	790
19:45	1421	1365	1327	1102	1159	1036	961	866	782



Time (min:sec)	Tc 1 (°F)	Tc 2 (°F)	Tc 3 (°F)	Tc 4 (°F)	Tc 5 (°F)	Tc 6 (°F)	Tc 7 (°F)	Tc 8 (°F)	Tc 9 (°F)
20:00	1452	1371	1323	1113	1168	1058	993	899	812
20:15	1443	1372	1323	1119	1193	1059	996	907	819
20:30	1460	1407	1350	1124	1187	1056	987	898	810
20:45	1459	1411	1367	1146	1176	1078	1019	931	838
21:00	1479	1426	1387	1140	1208	1062	986	894	809
21:15	1498	1432	1399	1168	1195	1092	1024	933	847
21:30	1492	1392	1387	1136	1162	1054	969	871	785
21:45	1485	1418	1416	1139	1200	1059	989	884	797
22:00	1485	1428	1430	1139	1246	1055	969	865	778
22:15	1488	1431	1419	1138	1211	1060	979	884	797
22:30	1494	1426	1437	1158	1283	1083	1003	901	808
22:45	1514	1422	1437	1154	1275	1083	1004	904	812
23:00	1500	1430	1449	1150	1277	1069	981	877	783
23:15	1524	1437	1467	1152	1286	1078	992	886	794
23:30	1513	1479	1525	1160	1272	1080	977	865	771
23:45	1582	1528	1435	1100	1202	1008	886	771	691
24:00	1346	1426	1355	1089	1194	1002	898	786	705
24:15	1524	1473	1407	1111	1239	1025	930	806	719
24:30	1380	1433	1409	1120	1203	1045	965	858	770
24:45	1443	1432	1410	1153	1247	1090	1013	908	813
25:00	1386	1386	1376	1128	1232	1068	979	872	780
25:15	1448	1442	1451	1180	1248	1132	1058	972	854
25:30	1451	1435	1457	1188	1261	1144	1063	977	867
25:45	1391	1455	1486	1202	1291	1155	1059	967	859
26:00	1481	1433	1460	1209	1271	1170	1076	985	872
26:15	1500	1437	1460	1227	1337	1185	1082	973	858
26:30	1457	1472	1496	1219	1364	1179	1083	982	868
26:45	1480	1440	1455	1190	1320	1158	1051	959	855
27:00	1489	1461	1466	1173	1312	1128	1009	909	812
27:15	1486	1470	1470	1164	1306	1121	1024	939	830
27:30	1492	1500	1526	1202	1350	1158	1063	973	856
27:45	1504	1541	1574	1215	1374	1175	1083	998	885
28:00	1466	1519	1543	1196	1350	1157	1064	978	870
28:15	1556	1574	1605	1211	1380	1162	1066	969	863
28:30	1516	1566	1585	1199	1357	1148	1048	952	850
28:45	1538	1584	1589	1186	1354	1134	1029	941	834
29:00	1564	1533	1542	1162	1321	1105	1004	917	809
29:15	1542	1597	1584	1141	1312	1070	958	866	763
29:30	1625	1622	1608	1177	1357	1099	992	900	810
29:45	1453	1632	1619	1175	1340	1099	980	879	783
30:00	1519	1592	1586	1168	1338	1089	978	879	789



Time (min:sec)	Tc 10 (°F)	Tc 11 (°F)	Tc 12 (°F)	Tc 13 (°F)	Tc 14 (°F)	Tc 15 (°F)	Tc 16 (°F)	Tc 17 (°F)	Tc 18 (°F)
0:00	74	74	74	75	74	74	74	74	70
0:15	165	163	135	138	83	115	97	75	70
0:30	228	217	179	179	99	156	135	90	70
0:45	267	254	210	207	106	171	156	92	70
1:00	290	273	228	219	102	182	164	96	70
1:15	301	284	240	224	106	181	164	98	70
1:30	305	287	246	231	112	189	179	101	70
1:45	316	297	256	239	110	187	183	105	70
2:00	310	286	252	231	106	185	189	109	71
2:15	326	305	264	238	110	186	192	114	71
2:30	321	299	263	241	119	190	204	115	71
2:45	331	310	270	242	113	190	197	117	71
3:00	333	310	275	251	116	191	196	113	71
3:15	348	326	286	266	113	186	209	118	71
3:30	339	318	282	260	112	184	213	116	71
3:45	361	346	300	274	136	192	209	121	71
4:00	354	331	292	266	135	191	216	114	71
4:15	362	339	299	272	142	199	213	116	71
4:30	359	335	296	272	143	207	214	121	71
4:45	357	335	297	269	141	202	214	125	72
5:00	367	342	301	267	143	210	224	132	72
5:15	453	434	359	328	129	245	257	136	72
5:30	510	480	394	361	138	267	291	135	72
5:45	508	472	400	368	145	293	306	137	72
6:00	527	492	416	370	151	311	316	148	73
6:15	572	536	447	392	142	302	315	143	73
6:30	556	512	441	395	140	322	301	148	73
6:45	572	531	448	387	137	320	310	163	74
7:00	585	542	464	392	133	307	307	165	74
7:15	573	535	463	392	134	311	332	166	75
7:30	572	537	466	408	140	316	344	165	75
7:45	580	536	464	409	149	327	330	167	76
8:00	583	535	459	403	156	315	335	168	76
8:15	584	536	465	411	161	320	340	176	78
8:30	587	543	470	413	166	318	348	175	79
8:45	608	567	486	424	162	323	334	173	80
9:00	614	571	490	434	157	326	339	173	81
9:15	630	588	502	439	159	326	325	174	82
9:30	621	579	494	427	154	347	336	169	83
9:45	614	578	496	432	159	337	348	171	84



Time (min:sec)	Tc 10 (°F)	Tc 11 (°F)	Tc 12 (°F)	Tc 13 (°F)	Tc 14 (°F)	Tc 15 (°F)	Tc 16 (°F)	Tc 17 (°F)	Tc 18 (°F)
10:00	626	589	504	444	165	354	359	176	85
10:15	631	578	502	440	176	346	346	183	86
10:30	665	611	525	460	172	351	343	164	87
10:45	636	589	508	438	179	345	358	174	88
11:00	644	597	516	448	182	354	349	165	89
11:15	637	598	523	459	175	357	352	172	90
11:30	651	602	522	449	185	365	351	189	91
11:45	666	614	531	457	182	365	358	192	91
12:00	672	621	534	464	171	368	360	187	92
12:15	666	617	529	456	179	365	372	196	93
12:30	671	633	541	473	173	355	389	193	94
12:45	650	600	523	448	164	346	394	215	95
13:00	701	650	554	474	178	353	383	209	95
13:15	692	643	550	473	182	365	393	202	96
13:30	684	629	540	458	177	387	366	204	96
13:45	716	650	555	476	177	371	359	201	98
14:00	695	638	550	473	179	358	369	184	97
14:15	698	636	550	471	175	353	363	188	99
14:30	690	620	541	467	187	359	372	184	99
14:45	682	613	539	468	184	361	375	192	99
15:00	687	628	549	472	196	365	383	184	99
15:15	704	641	556	483	191	387	365	214	104
15:30	707	653	562	481	179	342	394	230	106
15:45	694	646	556	469	184	355	411	248	107
16:00	718	668	574	485	193	366	412	251	108
16:15	715	655	567	477	202	376	404	249	109
16:30	741	664	574	480	192	385	394	248	110
16:45	750	682	589	501	178	376	403	258	112
17:00	745	681	590	496	179	357	397	254	112
17:15	781	713	618	525	172	338	378	256	113
17:30	763	707	618	525	174	339	423	265	114
17:45	802	727	633	546	180	350	370	241	114
18:00	751	694	607	515	184	390	377	247	114
18:15	782	716	623	531	186	385	382	246	115
18:30	770	712	623	534	166	350	370	212	112
18:45	749	689	607	511	162	360	425	258	117
19:00	761	700	613	504	155	336	438	262	116
19:15	740	686	602	501	168	354	437	241	114
19:30	750	695	609	507	170	369	418	219	114
19:45	739	676	595	499	182	399	403	231	114



Time (min:sec)	Tc 10 (°F)	Tc 11 (°F)	Tc 12 (°F)	Tc 13 (°F)	Tc 14 (°F)	Tc 15 (°F)	Tc 16 (°F)	Tc 17 (°F)	Tc 18 (°F)
20:00	770	710	621	526	174	391	391	230	115
20:15	783	736	641	544	164	365	415	204	112
20:30	771	720	630	526	161	364	422	251	117
20:45	798	746	649	555	169	370	415	245	116
21:00	761	695	615	510	214	405	411	220	116
21:15	813	757	655	547	200	374	430	286	122
21:30	739	693	614	503	180	355	499	295	122
21:45	754	691	614	513	191	361	488	301	122
22:00	733	672	603	509	184	379	475	237	116
22:15	766	710	628	536	200	380	453	232	116
22:30	773	715	633	539	185	381	473	235	117
22:45	778	725	638	541	176	362	467	231	118
23:00	742	700	624	525	192	366	488	239	118
23:15	759	714	631	533	179	360	493	243	119
23:30	733	687	611	505	195	378	504	276	123
23:45	644	609	559	457	178	336	576	303	124
24:00	655	605	554	461	184	341	491	287	123
24:15	668	606	549	453	174	336	484	296	125
24:30	728	662	582	491	196	372	468	329	131
24:45	765	701	615	525	182	364	446	282	129
25:00	736	682	601	497	162	344	485	275	127
25:15	815	764	662	559	167	377	492	339	135
25:30	823	767	666	565	176	376	475	321	135
25:45	803	737	652	554	203	392	488	307	136
26:00	812	752	653	537	206	392	488	327	137
26:15	795	734	655	535	205	387	498	313	137
26:30	805	735	654	534	218	402	483	239	131
26:45	793	724	644	534	195	364	493	267	132
27:00	745	676	609	495	174	349	485	285	133
27:15	765	701	625	518	179	374	489	258	133
27:30	781	707	626	513	204	418	477	251	134
27:45	813	744	656	557	201	397	477	244	135
28:00	808	745	655	545	201	414	480	235	137
28:15	802	743	651	539	195	395	490	231	137
28:30	787	733	648	539	198	381	476	245	138
28:45	770	710	632	527	205	382	484	225	139
29:00	744	683	610	505	215	421	466	239	140
29:15	700	640	575	472	235	418	480	252	141
29:30	720	657	588	490	239	421	415	210	141
29:45	703	638	571	479	230	420	415	220	143
30:00	708	650	577	478	214	413	427	226	144



Time (min:sec)	Tc 19(°F)	Tc 20(°F)	Tc 21(°F)	Tc 22(°F)	Tc 23(°F)	Tc 24(°F)	Tc 25(°F)	Tc 26(°F)	Tc 27(°F)
0:00	70	70	72	72	72	72	72	72	72
0:15	70	71	72	72	72	72	72	72	72
0:30	70	71	72	72	73	73	73	72	72
0:45	70	72	73	73	73	73	73	73	73
1:00	70	74	73	74	74	74	74	74	74
1:15	70	76	74	75	75	75	76	76	76
1:30	70	79	75	76	76	77	77	78	78
1:45	70	84	77	78	78	79	79	80	81
2:00	70	88	78	79	80	81	81	83	83
2:15	71	94	80	81	82	83	83	86	86
2:30	71	99	81	83	84	85	86	88	89
2:45	71	105	83	85	87	87	89	91	92
3:00	71	112	85	87	90	90	92	93	94
3:15	71	119	87	89	93	93	95	96	97
3:30	71	126	89	92	95	95	98	99	101
3:45	71	133	91	94	98	98	101	101	102
4:00	71	140	93	96	101	101	103	103	105
4:15	71	147	95	99	104	103	106	106	108
4:30	71	154	97	101	107	106	109	109	110
4:45	71	162	99	104	109	109	111	112	114
5:00	72	169	102	107	112	112	114	115	117
5:15	72	176	104	110	114	115	117	119	121
5:30	72	185	107	113	117	118	120	123	124
5:45	72	195	110	117	121	122	124	127	129
6:00	72	206	115	122	126	127	129	132	134
6:15	73	217	120	127	131	132	135	138	140
6:30	73	227	125	133	136	139	141	144	146
6:45	74	237	131	139	142	145	147	150	152
7:00	74	246	137	145	148	151	154	156	159
7:15	75	254	142	151	154	158	161	163	166
7:30	75	262	147	157	160	164	167	169	172
7:45	76	270	152	163	166	171	174	175	178
8:00	77	277	156	168	171	177	180	181	184
8:15	78	283	161	174	177	183	186	187	190
8:30	80	289	165	179	182	189	192	194	197
8:45	81	295	169	184	188	195	198	199	203
9:00	82	302	173	190	193	200	204	205	208
9:15	83	307	177	194	197	206	209	210	213
9:30	84	313	181	198	202	212	215	215	218
9:45	85	319	185	202	208	218	220	221	224



Time (min:sec)	Tc 19(°F)	Tc 20(°F)	Tc 21(°F)	Tc 22(°F)	Tc 23(°F)	Tc 24(°F)	Tc 25(°F)	Tc 26(°F)	Tc 27(°F)
10:00	87	325	189	206	213	223	226	226	229
10:15	88	331	192	211	217	229	231	232	234
10:30	89	336	196	215	222	234	237	237	240
10:45	90	341	199	218	227	239	242	241	246
11:00	91	347	203	223	232	244	247	247	251
11:15	92	353	207	227	237	249	253	251	256
11:30	94	359	212	232	242	254	258	256	262
11:45	94	365	215	236	247	259	263	262	266
12:00	95	370	220	240	251	264	268	266	272
12:15	95	376	224	245	256	269	273	271	276
12:30	96	380	228	249	261	274	279	277	282
12:45	96	385	232	253	266	278	284	283	287
13:00	96	389	236	256	269	282	288	286	291
13:15	97	394	240	260	273	286	292	291	294
13:30	97	396	244	264	277	291	296	295	300
13:45	98	401	247	268	281	295	301	299	302
14:00	98	403	250	271	286	300	306	303	307
14:15	99	407	253	274	288	303	309	305	310
14:30	98	409	257	277	291	308	313	309	314
14:45	98	413	260	278	292	311	317	312	317
15:00	99	417	261	281	296	315	320	316	319
15:15	104	426	263	282	298	317	322	319	322
15:30	105	434	265	285	300	319	325	322	326
15:45	107	442	267	287	305	323	327	326	329
16:00	108	451	269	290	308	325	330	329	331
16:15	108	458	273	292	309	329	334	334	334
16:30	109	466	274	294	313	331	337	336	337
16:45	111	477	277	297	316	332	339	338	340
17:00	111	488	279	300	318	337	343	343	343
17:15	112	500	280	303	322	339	345	345	346
17:30	113	513	283	305	324	343	349	350	350
17:45	112	527	285	308	327	347	352	353	352
18:00	113	544	288	311	329	350	356	355	355
18:15	114	560	289	313	332	351	357	357	357
18:30	110	573	293	317	337	357	362	362	360
18:45	115	594	293	317	336	357	364	365	362
19:00	115	608	296	319	339	361	366	368	365
19:15	114	621	298	323	342	363	369	370	367
19:30	115	635	300	325	343	365	371	373	371
19:45	114	645	302	327	346	368	374	375	373



Time (min:sec)	Tc 19(°F)	Tc 20(°F)	Tc 21(°F)	Tc 22(°F)	Tc 23(°F)	Tc 24(°F)	Tc 25(°F)	Tc 26(°F)	Tc 27(°F)
20:00	115	657	304	330	349	371	377	378	376
20:15	112	665	309	333	351	373	379	379	377
20:30	117	682	309	334	353	374	380	382	380
20:45	114	689	313	338	356	378	384	385	382
21:00	115	703	314	340	358	378	384	387	384
21:15	122	719	315	340	359	380	385	391	387
21:30	122	730	317	342	362	380	388	392	390
21:45	123	742	319	345	364	381	390	395	392
22:00	118	748	324	349	368	386	394	396	393
22:15	119	760	325	351	372	387	396	398	396
22:30	118	767	329	354	375	391	398	400	399
22:45	119	778	331	356	378	393	400	402	402
23:00	120	788	333	358	380	396	404	405	405
23:15	124	801	336	360	383	395	404	407	407
23:30	125	819	337	362	384	397	405	408	409
23:45	126	850	339	363	385	400	408	410	412
24:00	125	893	341	366	387	400	407	411	414
24:15	127	986	343	368	389	401	410	414	416
24:30	133	1175	342	368	389	401	410	415	418
24:45	131	1228	347	372	393	403	412	417	420
25:00	129	1258	350	375	396	405	413	418	422
25:15	137	1369	349	375	395	405	416	422	423
25:30	137	1402	352	378	396	409	421	425	425
25:45	136	1403	356	382	398	412	424	429	428
26:00	139	1469	358	385	402	416	429	432	432
26:15	140	1471	361	389	404	419	431	435	435
26:30	132	1479	368	395	410	426	438	440	439
26:45	134	1474	375	402	415	430	442	444	442
27:00	135	1443	383	416	423	436	448	449	445
27:15	136	1475	391	433	433	443	453	453	449
27:30	137	1545	401	446	446	450	457	457	452
27:45	138	1609	408	457	457	457	462	462	454
28:00	139	1544	412	466	464	462	467	465	457
28:15	140	1591	421	467	474	468	473	471	461
28:30	141	1620	429	469	476	471	476	474	464
28:45	142	1615	433	470	476	473	477	474	465
29:00	143	1543	437	470	474	474	479	476	469
29:15	144	1639	441	472	480	477	482	479	471
29:30	145	1649	450	479	491	483	488	484	473
29:45	146	1624	458	487	495	487	491	487	475
30:00	147	1595	474	495	502	493	497	493	480



Time (min:sec)	Tc 28(°F)	Tc 29(°F)	Tc 30(°F)	Tc 31(°F)	Tc 32(°F)	Tc 33(°F)	Tc 34(°F)	Tc 35(°F)	Tc 36(°F)
0:00	72	72	73	71	71	72	72	72	71
0:15	72	72	73	71	71	72	72	72	71
0:30	72	73	73	71	71	72	72	72	71
0:45	72	73	74	71	71	72	72	72	71
1:00	73	73	74	71	71	72	72	72	71
1:15	73	74	75	71	71	72	72	73	71
1:30	74	74	76	71	71	72	72	73	71
1:45	74	75	77	71	72	72	72	74	71
2:00	75	76	78	72	72	72	72	74	71
2:15	76	77	79	72	72	72	72	75	71
2:30	77	78	81	72	72	72	72	76	71
2:45	78	79	82	72	72	72	72	77	71
3:00	79	81	84	72	72	72	72	77	71
3:15	80	82	86	72	72	73	73	79	71
3:30	81	83	87	72	72	73	73	79	71
3:45	81	84	88	73	73	74	74	82	72
4:00	82	85	89	73	73	74	74	83	72
4:15	83	87	91	73	74	74	74	84	72
4:30	85	88	92	74	74	74	74	85	72
4:45	86	90	94	74	74	74	74	86	72
5:00	88	92	96	73	74	74	74	87	72
5:15	90	94	99	73	73	74	74	87	72
5:30	91	96	100	73	73	74	74	89	72
5:45	93	98	102	73	73	74	74	90	73
6:00	95	100	105	73	73	74	74	92	73
6:15	97	103	108	73	74	74	74	94	73
6:30	99	105	111	74	74	74	74	96	73
6:45	102	108	114	74	74	75	75	98	73
7:00	104	111	117	74	74	75	75	100	73
7:15	107	114	121	74	74	75	75	103	74
7:30	109	117	125	75	75	76	75	105	74
7:45	112	121	127	75	75	76	76	108	75
8:00	115	124	132	75	75	76	76	110	75
8:15	118	127	134	75	76	77	76	113	75
8:30	120	131	138	76	76	77	77	116	76
8:45	123	134	141	76	76	77	77	118	76
9:00	126	137	144	76	77	78	77	121	76
9:15	129	141	147	77	77	78	77	124	77
9:30	132	144	149	77	78	79	78	126	77
9:45	135	146	152	78	78	79	78	129	78



Time (min:sec)	Tc 28(°F)	Tc 29(°F)	Tc 30(°F)	Tc 31(°F)	Tc 32(°F)	Tc 33(°F)	Tc 34(°F)	Tc 35(°F)	Tc 36(°F)
10:00	138	149	154	78	78	80	78	132	78
10:15	141	152	157	78	79	80	79	135	78
10:30	144	156	159	79	79	81	79	138	79
10:45	146	158	161	79	80	81	79	140	79
11:00	149	161	164	79	80	82	80	143	80
11:15	152	163	165	80	80	82	80	145	80
11:30	154	166	167	80	81	83	80	148	81
11:45	157	169	170	81	82	83	81	150	81
12:00	159	171	172	81	83	84	81	153	82
12:15	162	174	174	82	83	84	82	156	83
12:30	165	177	177	82	84	85	82	159	83
12:45	168	180	181	83	84	85	83	161	84
13:00	170	183	184	83	84	86	83	163	84
13:15	172	185	186	84	85	86	83	165	86
13:30	174	187	187	84	85	87	83	168	87
13:45	176	188	189	85	86	88	84	170	87
14:00	179	191	191	85	87	89	84	172	88
14:15	183	194	194	86	88	89	85	174	89
14:30	185	197	197	86	88	90	85	177	89
14:45	187	198	199	87	88	91	86	179	90
15:00	189	200	200	88	89	92	86	181	92
15:15	191	202	203	88	89	93	87	183	95
15:30	193	204	205	89	90	93	87	186	96
15:45	195	205	207	89	91	94	88	188	98
16:00	197	207	209	90	91	95	88	189	99
16:15	199	209	210	90	92	96	89	191	99
16:30	201	211	213	91	92	97	89	193	101
16:45	203	214	214	92	93	97	90	195	99
17:00	205	217	217	92	94	99	91	197	102
17:15	206	218	219	93	94	99	91	198	103
17:30	210	220	220	93	95	100	92	200	106
17:45	211	221	223	94	96	101	92	201	105
18:00	212	222	223	95	97	102	93	204	105
18:15	214	224	227	95	97	103	94	205	107
18:30	217	226	226	96	98	103	94	206	107
18:45	218	227	226	97	97	104	95	207	109
19:00	219	227	228	97	98	105	95	209	109
19:15	220	228	232	98	99	105	96	210	106
19:30	221	230	235	99	100	106	96	212	105
19:45	223	231	237	99	101	107	97	213	109



Time (min:sec)	Tc 28(°F)	Tc 29(°F)	Tc 30(°F)	Tc 31(°F)	Tc 32(°F)	Tc 33(°F)	Tc 34(°F)	Tc 35(°F)	Tc 36(°F)
20:00	224	232	238	100	101	108	98	215	108
20:15	225	234	234	101	101	108	98	216	106
20:30	227	235	236	101	103	109	99	217	109
20:45	228	237	241	102	103	109	100	219	109
21:00	230	239	244	102	104	110	100	221	113
21:15	232	241	246	103	105	111	101	223	117
21:30	233	242	245	104	106	112	102	223	117
21:45	233	243	248	104	107	112	102	224	118
22:00	235	245	248	105	108	114	103	225	112
22:15	237	246	251	106	107	114	104	227	114
22:30	238	247	252	106	108	115	104	228	115
22:45	239	248	249	107	108	116	105	228	114
23:00	240	248	253	108	109	117	105	231	118
23:15	241	250	254	109	110	117	106	232	116
23:30	242	252	258	109	111	118	106	234	118
23:45	243	253	261	110	112	118	107	235	121
24:00	245	253	263	110	113	120	108	236	121
24:15	244	254	264	111	114	120	108	238	125
24:30	245	255	266	111	115	121	109	238	126
24:45	246	256	267	112	119	123	109	240	124
25:00	246	258	266	112	116	123	110	240	129
25:15	246	257	268	113	119	124	110	241	130
25:30	247	258	269	113	118	125	111	243	132
25:45	248	260	271	114	119	125	111	245	133
26:00	250	261	273	114	122	126	112	245	130
26:15	251	262	272	115	121	127	112	246	134
26:30	250	262	273	115	122	128	112	246	126
26:45	252	263	273	116	123	128	113	247	128
27:00	252	264	275	116	123	129	113	248	129
27:15	254	266	276	117	126	130	114	248	130
27:30	255	267	277	118	127	131	114	249	131
27:45	255	268	278	118	129	131	114	249	132
28:00	257	269	280	118	127	131	113	251	133
28:15	260	270	281	120	129	133	116	252	133
28:30	259	271	281	120	128	133	116	252	135
28:45	260	272	283	121	130	134	117	253	135
29:00	262	273	285	122	129	135	118	255	136
29:15	263	274	286	122	129	135	119	257	137
29:30	264	275	286	122	131	136	119	258	138
29:45	265	276	287	123	131	137	120	260	138
30:00	266	277	288	124	132	137	121	261	139



Time (min:sec)	Tc 37(°F)	Tc 38(°F)	Tc 39(°F)	Tc 40(°F)	Tc 41(°F)	Tc 42(°F)	Tc 43(°F)	Tc 44(°F)	Tc 45(°F)
0:00	71	71	71	71	79	78	92	83	99
0:15	71	71	71	71	411	414	625	631	686
0:30	71	71	71	71	696	684	964	930	980
0:45	71	71	71	71	809	813	1011	1001	1118
1:00	71	71	71	71	854	872	1057	1044	1112
1:15	71	71	71	72	883	903	1070	1046	1147
1:30	71	71	71	72	900	920	1077	1074	1150
1:45	71	71	71	73	912	935	1076	1065	1192
2:00	71	72	71	73	928	946	1081	1093	1156
2:15	71	72	71	74	936	958	1089	1090	1221
2:30	71	72	72	75	946	964	1094	1099	1194
2:45	71	72	72	76	952	965	1102	1107	1202
3:00	71	72	72	77	959	972	1097	1109	1218
3:15	72	72	72	77	960	977	1112	1131	1213
3:30	72	72	72	79	963	994	1088	1123	1214
3:45	72	73	72	80	966	994	1104	1121	1235
4:00	72	73	72	81	975	1001	1115	1137	1218
4:15	72	73	72	82	987	1005	1123	1146	1259
4:30	72	73	73	83	991	1005	1116	1144	1213
4:45	72	73	73	84	989	1014	1114	1150	1228
5:00	72	73	73	85	998	1020	1129	1142	1249
5:15	73	73	73	87	1054	1090	1237	1273	1370
5:30	73	74	73	88	1098	1139	1273	1308	1454
5:45	73	74	73	90	1125	1153	1293	1359	1430
6:00	73	74	74	91	1146	1166	1323	1364	1434
6:15	74	74	74	93	1153	1176	1323	1384	1426
6:30	74	75	74	95	1171	1188	1333	1410	1432
6:45	74	75	74	97	1189	1213	1370	1438	1494
7:00	74	75	75	100	1195	1221	1362	1403	1499
7:15	75	76	75	102	1201	1222	1364	1442	1471
7:30	75	76	75	105	1208	1237	1373	1425	1510
7:45	76	76	75	107	1206	1239	1368	1413	1471
8:00	76	77	76	110	1218	1245	1385	1425	1506
8:15	77	78	76	113	1220	1241	1381	1425	1491
8:30	77	78	77	116	1220	1250	1367	1395	1466
8:45	78	78	77	118	1225	1247	1378	1416	1484
9:00	78	79	77	121	1230	1251	1384	1445	1465
9:15	79	79	77	124	1242	1255	1392	1458	1486
9:30	80	80	78	126	1240	1265	1392	1442	1494
9:45	80	81	78	129	1246	1273	1399	1453	1529



Time (min:sec)	Tc 37(°F)	Tc 38(°F)	Tc 39(°F)	Tc 40(°F)	Tc 41(°F)	Tc 42(°F)	Tc 43(°F)	Tc 44(°F)	Tc 45(°F)
10:00	81	81	78	132	1265	1291	1434	1480	1539
10:15	82	81	79	135	1288	1314	1456	1495	1576
10:30	83	82	79	138	1300	1320	1470	1527	1577
10:45	83	83	80	140	1305	1340	1468	1509	1586
11:00	83	83	80	143	1326	1343	1486	1523	1573
11:15	84	84	80	146	1324	1356	1478	1527	1569
11:30	85	85	81	148	1333	1358	1483	1533	1562
11:45	85	85	81	151	1335	1373	1492	1558	1590
12:00	86	86	81	154	1343	1375	1489	1549	1634
12:15	88	87	82	156	1352	1377	1519	1552	1628
12:30	88	87	82	159	1354	1381	1507	1572	1629
12:45	90	88	83	162	1358	1395	1519	1570	1666
13:00	89	89	83	164	1360	1393	1508	1584	1617
13:15	91	90	84	167	1367	1394	1523	1584	1654
13:30	93	91	84	170	1374	1396	1530	1576	1658
13:45	93	91	84	172	1378	1400	1529	1602	1671
14:00	94	93	86	175	1388	1400	1541	1631	1665
14:15	95	94	86	177	1402	1413	1550	1608	1683
14:30	93	94	86	179	1397	1413	1543	1619	1678
14:45	94	95	86	181	1401	1425	1568	1634	1675
15:00	97	98	89	186	1407	1438	1564	1638	1760
15:15	101	101	91	190	1426	1465	1575	1659	1747
15:30	104	102	93	194	1445	1493	1609	1674	1760
15:45	106	104	95	197	1464	1493	1623	1703	1780
16:00	109	106	95	199	1474	1492	1638	1703	1758
16:15	108	107	96	201	1481	1496	1641	1717	1766
16:30	109	107	96	203	1486	1491	1634	1728	1790
16:45	107	107	96	206	1490	1510	1645	1764	1793
17:00	114	109	97	207	1498	1516	1665	1779	1840
17:15	114	111	98	210	1490	1502	1639	1708	1787
17:30	117	114	100	214	1485	1501	1639	1703	1777
17:45	117	113	99	214	1494	1507	1640	1729	1789
18:00	116	114	99	215	1495	1507	1641	1732	1786
18:15	118	115	101	217	1491	1508	1637	1713	1809
18:30	118	116	101	219	1496	1507	1632	1716	1784
18:45	119	117	102	221	1505	1514	1640	1753	1767
19:00	119	117	102	222	1511	1527	1659	1756	1837
19:15	117	115	99	220	1510	1524	1659	1744	1801
19:30	115	114	98	221	1510	1536	1671	1742	1830
19:45	121	117	98	222	1510	1519	1648	1741	1784



Time (min:sec)	Tc 37(°F)	Tc 38(°F)	Tc 39(°F)	Tc 40(°F)	Tc 41(°F)	Tc 42(°F)	Tc 43(°F)	Tc 44(°F)	Tc 45(°F)
20:00	118	118	101	226	1509	1528	1656	1742	1866
20:15	115	116	100	226	1527	1553	1706	1763	1872
20:30	118	118	101	227	1538	1547	1693	1811	1841
20:45	118	118	101	228	1540	1550	1708	1804	1848
21:00	124	123	105	232	1544	1550	1690	1804	1836
21:15	129	127	108	237	1551	1562	1715	1790	1891
21:30	130	127	108	238	1554	1566	1731	1791	1857
21:45	129	127	108	240	1555	1569	1715	1808	1883
22:00	123	122	103	236	1560	1561	1712	1831	1864
22:15	123	124	104	237	1559	1567	1714	1810	1877
22:30	123	123	103	238	1564	1562	1703	1827	1813
22:45	123	124	104	242	1566	1575	1719	1825	1867
23:00	128	128	107	244	1561	1577	1708	1814	1863
23:15	125	126	106	243	1572	1573	1729	1832	1858
23:30	127	129	108	247	1577	1563	1718	1859	1787
23:45	130	130	109	248	1603	1592	1762	1880	1850
24:00	129	132	110	252	1626	1605	1778	1900	1871
24:15	132	136	113	254	1600	1581	1746	1864	1818
24:30	136	138	115	255	1595	1596	1739	1878	1858
24:45	135	136	113	254	1571	1566	1701	1813	1818
25:00	143	141	118	259	1574	1568	1724	1855	1832
25:15	145	142	119	260	1595	1582	1736	1903	1843
25:30	147	144	120	262	1588	1582	1736	1860	1844
25:45	149	146	122	264	1589	1588	1736	1849	1866
26:00	146	143	119	262	1602	1587	1757	1890	1829
26:15	151	147	122	266	1596	1582	1754	1889	1824
26:30	143	140	114	257	1599	1580	1739	1863	1828
26:45	145	142	115	259	1606	1595	1765	1904	1854
27:00	147	143	116	259	1607	1601	1769	1881	1892
27:15	148	145	117	260	1603	1597	1765	1870	1855
27:30	150	146	117	261	1597	1577	1737	1886	1825
27:45	150	147	118	263	1612	1586	1740	1920	1818
28:00	152	149	120	264	1619	1611	1781	1905	1881
28:15	151	149	120	265	1611	1605	1750	1881	1902
28:30	153	150	121	266	1619	1603	1757	1916	1845
28:45	154	151	121	266	1612	1604	1756	1919	1874
29:00	155	151	122	268	1621	1598	1766	1920	1893
29:15	156	152	122	269	1617	1611	1754	1881	1883
29:30	156	152	123	269	1607	1610	1752	1867	1885
29:45	158	153	123	270	1612	1633	1749	1841	1969
30:00	158	154	124	271	1629	1640	1775	1881	1932



Time (min:sec)	Tc 46(°F)	Tc 47(°F)	Tc 48(°F)	Tc 49(°F)	Tc 50(°F)	Tc 51(°F)	Tc 52(°F)	Tc 53(°F)	Tc 54(°F)
0:00	81	86	83	67	67	66	67	67	67
0:15	570	507	549	67	67	66	67	67	67
0:30	830	820	833	67	67	66	67	67	67
0:45	947	954	944	67	67	66	67	67	67
1:00	1017	1032	992	67	67	66	67	67	67
1:15	1019	1053	1004	67	67	66	67	67	67
1:30	1037	1061	1027	67	67	66	67	67	67
1:45	1041	1079	1048	67	67	66	67	67	67
2:00	1060	1090	1065	67	67	66	67	67	67
2:15	1068	1104	1077	67	67	66	67	67	67
2:30	1086	1129	1092	67	67	66	67	67	67
2:45	1082	1122	1099	67	67	66	67	67	67
3:00	1088	1131	1113	67	67	66	67	67	67
3:15	1136	1170	1126	67	67	67	67	68	67
3:30	1113	1160	1141	67	67	67	67	68	68
3:45	1130	1173	1150	67	67	66	67	68	68
4:00	1148	1187	1165	67	67	66	67	68	68
4:15	1133	1184	1174	67	67	67	67	68	68
4:30	1153	1187	1166	67	67	67	68	68	68
4:45	1143	1190	1165	67	67	67	68	68	68
5:00	1162	1218	1186	67	67	67	68	68	69
5:15	1258	1329	1296	68	67	67	68	69	69
5:30	1292	1355	1324	68	67	67	68	69	69
5:45	1386	1424	1371	68	68	68	68	69	69
6:00	1414	1497	1411	68	68	68	69	69	70
6:15	1424	1479	1412	68	68	68	69	69	70
6:30	1452	1513	1440	69	68	68	69	69	70
6:45	1469	1534	1466	69	68	68	69	69	70
7:00	1468	1507	1454	69	68	68	69	69	70
7:15	1469	1508	1444	69	69	69	70	69	70
7:30	1461	1494	1446	69	69	69	70	69	70
7:45	1471	1497	1425	70	69	69	70	70	70
8:00	1459	1528	1463	70	69	69	70	70	70
8:15	1481	1533	1454	70	70	70	71	70	71
8:30	1476	1500	1443	71	70	70	71	70	71
8:45	1496	1526	1463	71	70	70	71	70	71
9:00	1477	1525	1468	71	71	70	71	71	71
9:15	1480	1538	1514	71	71	70	72	70	71
9:30	1489	1508	1455	72	71	71	72	71	72
9:45	1501	1535	1480	72	72	71	72	71	72



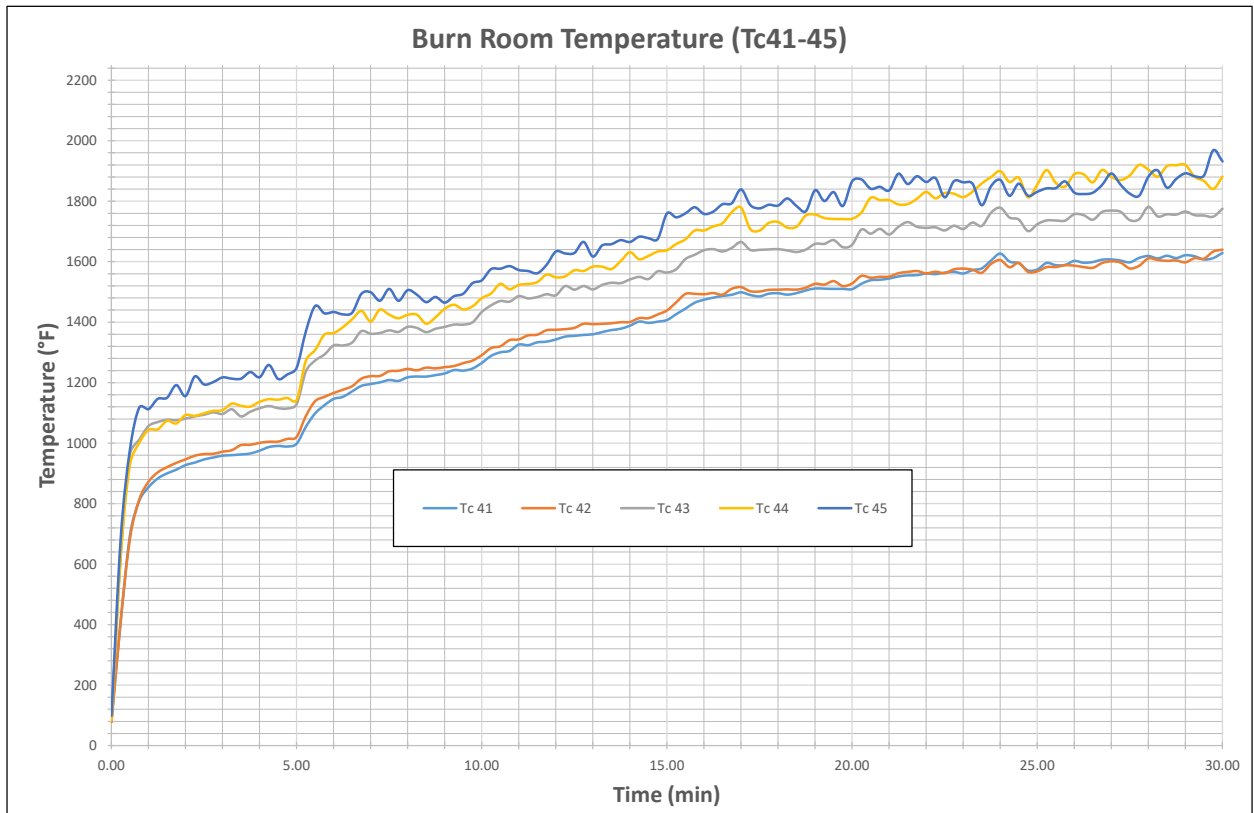
Time (min:sec)	Tc 46(°F)	Tc 47(°F)	Tc 48(°F)	Tc 49(°F)	Tc 50(°F)	Tc 51(°F)	Tc 52(°F)	Tc 53(°F)	Tc 54(°F)
10:00	1553	1565	1500	72	72	71	73	71	73
10:15	1592	1595	1549	72	72	71	73	72	73
10:30	1616	1615	1560	73	72	71	73	72	73
10:45	1630	1627	1566	73	72	71	74	72	73
11:00	1661	1646	1575	73	73	72	74	73	74
11:15	1656	1666	1593	73	73	73	74	73	74
11:30	1676	1703	1599	74	73	73	75	74	75
11:45	1676	1662	1617	74	73	73	75	74	75
12:00	1697	1719	1617	74	74	73	75	74	75
12:15	1705	1710	1642	75	74	73	75	74	75
12:30	1691	1694	1635	75	74	73	76	74	75
12:45	1669	1691	1648	75	74	73	76	75	75
13:00	1705	1685	1645	75	74	73	76	75	76
13:15	1718	1730	1643	75	74	73	76	75	76
13:30	1723	1702	1661	76	75	73	77	75	77
13:45	1740	1713	1666	75	75	73	77	75	76
14:00	1707	1727	1710	76	76	74	77	76	77
14:15	1736	1752	1692	76	76	75	78	76	77
14:30	1741	1759	1672	77	76	75	78	76	78
14:45	1730	1743	1685	77	76	74	78	76	78
15:00	1725	1732	1741	78	77	75	78	77	78
15:15	1762	1780	1805	78	77	75	78	77	78
15:30	1756	1793	1770	78	77	76	79	78	79
15:45	1800	1815	1770	78	77	76	79	78	79
16:00	1797	1796	1782	78	77	76	79	78	79
16:15	1809	1808	1773	78	78	77	79	78	79
16:30	1823	1808	1777	79	78	78	80	79	80
16:45	1819	1802	1782	79	78	77	80	79	79
17:00	1809	1840	1810	79	78	77	80	79	79
17:15	1831	1861	1829	79	79	79	80	79	81
17:30	1838	1846	1816	80	79	79	81	80	81
17:45	1841	1865	1835	80	78	78	80	80	80
18:00	1803	1815	1812	80	79	78	81	80	80
18:15	1819	1830	1823	80	79	78	81	80	81
18:30	1835	1876	1842	80	80	78	81	80	81
18:45	1866	1841	1839	81	80	78	81	80	81
19:00	1866	1826	1806	81	80	79	81	80	81
19:15	1843	1855	1846	81	80	79	81	80	82
19:30	1843	1867	1858	81	80	79	82	81	82
19:45	1851	1868	1869	81	80	80	82	81	82



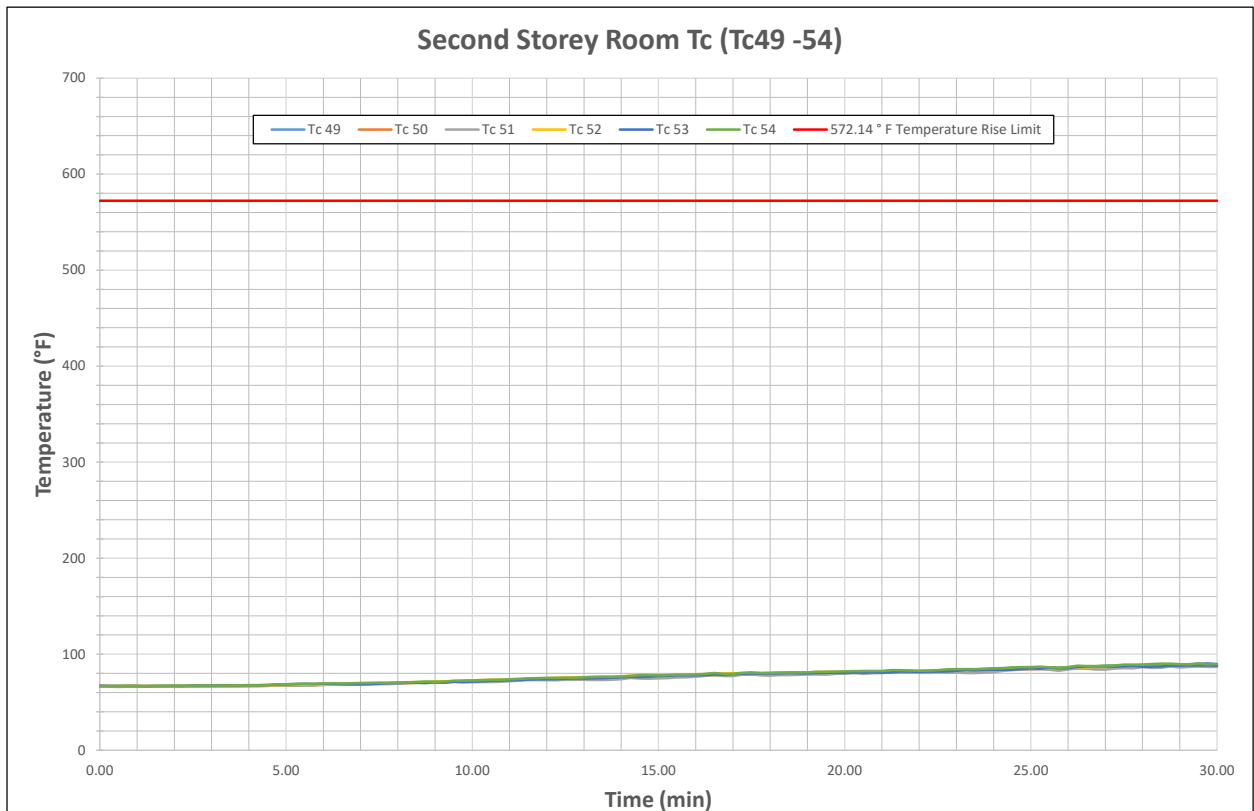
Time (min:sec)	Tc 46(°F)	Tc 47(°F)	Tc 48(°F)	Tc 49(°F)	Tc 50(°F)	Tc 51(°F)	Tc 52(°F)	Tc 53(°F)	Tc 54(°F)
20:00	1852	1843	1843	81	80	80	82	80	82
20:15	1882	1875	1857	81	81	80	82	81	82
20:30	1881	1886	1871	82	81	79	82	81	83
20:45	1865	1888	1879	82	81	80	82	81	83
21:00	1888	1897	1884	82	81	80	82	81	83
21:15	1880	1912	1899	82	81	81	82	81	83
21:30	1894	1921	1906	83	81	82	83	82	83
21:45	1892	1904	1886	83	81	81	83	82	83
22:00	1903	1894	1912	82	81	81	83	82	83
22:15	1902	1894	1921	82	82	81	83	82	83
22:30	1911	1918	1905	83	82	81	83	82	83
22:45	1915	1914	1928	83	83	81	83	82	84
23:00	1899	1902	1927	84	83	81	83	83	84
23:15	1934	1942	1901	84	83	80	84	84	84
23:30	1929	1918	1892	84	83	80	84	84	84
23:45	1883	1875	1900	84	83	81	84	84	85
24:00	1887	1898	1876	85	83	81	85	84	85
24:15	1890	1934	1926	85	84	83	85	84	85
24:30	1927	1920	1946	85	84	84	85	84	86
24:45	1896	1909	1928	85	84	84	85	85	87
25:00	1931	1938	1951	85	84	85	86	85	86
25:15	1915	1925	1922	85	84	85	86	85	87
25:30	1922	1943	1946	86	84	84	86	86	86
25:45	1924	1940	1966	86	84	83	86	85	86
26:00	1949	1948	1925	86	85	84	86	85	86
26:15	1959	1949	1925	87	85	85	86	87	88
26:30	1961	1963	1944	87	86	85	86	87	88
26:45	1965	1961	1934	87	86	84	87	87	87
27:00	1965	1972	1934	88	86	84	87	87	88
27:15	1965	1948	1902	88	87	85	88	87	88
27:30	1947	1971	1923	89	87	85	89	87	89
27:45	1945	1960	1945	88	87	85	88	88	89
28:00	1966	1961	1945	89	87	86	88	87	89
28:15	1976	1993	1988	89	87	86	89	87	90
28:30	1941	1946	1933	89	87	86	89	87	90
28:45	1961	1945	1934	90	88	87	89	88	90
29:00	1995	1952	1923	89	88	86	89	88	90
29:15	1945	1952	1967	89	88	87	88	88	89
29:30	1959	1968	2008	90	88	87	88	88	90
29:45	1920	1935	1972	91	88	87	88	88	89
30:00	1950	1979	1980	90	88	87	88	88	90



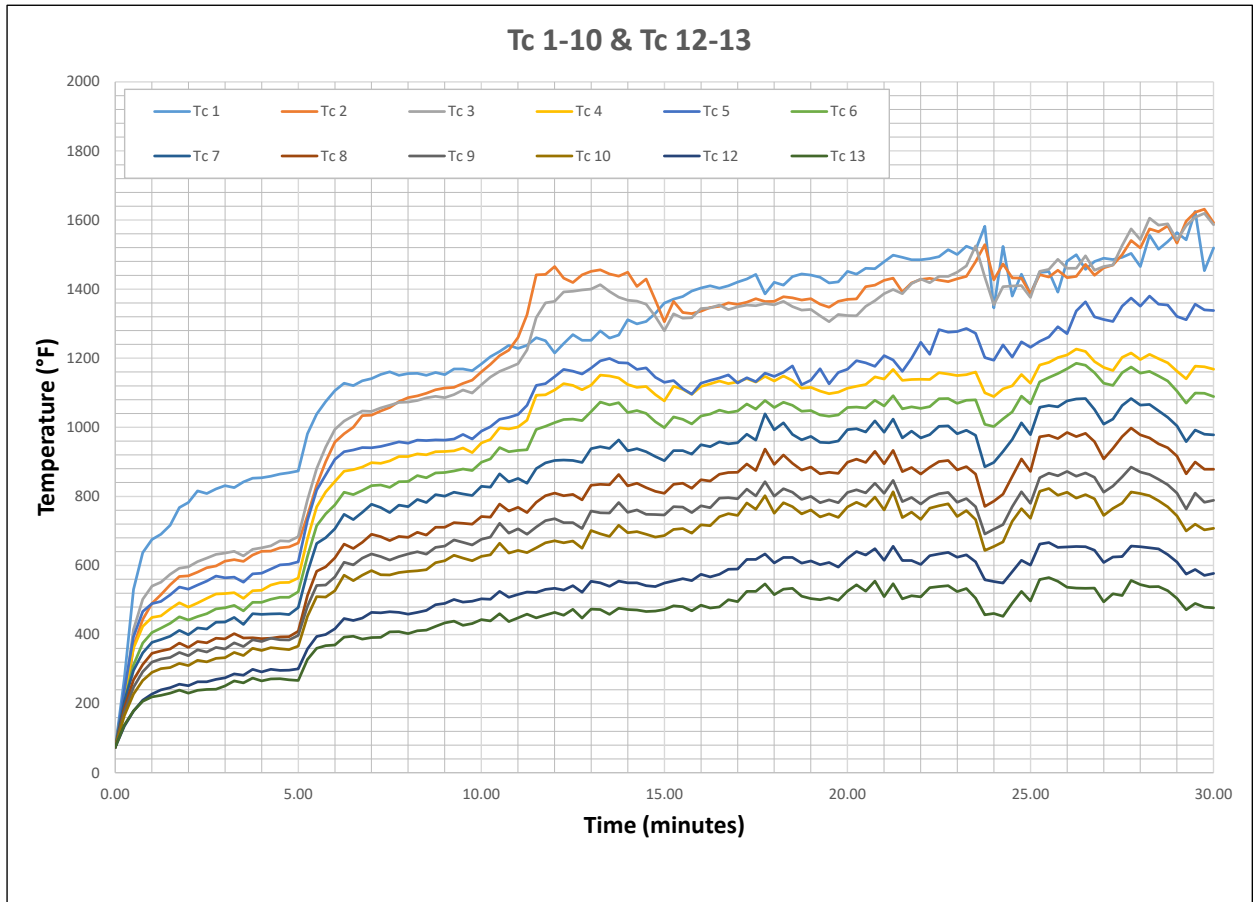
18. APPENDIX 6 – GRAPHS



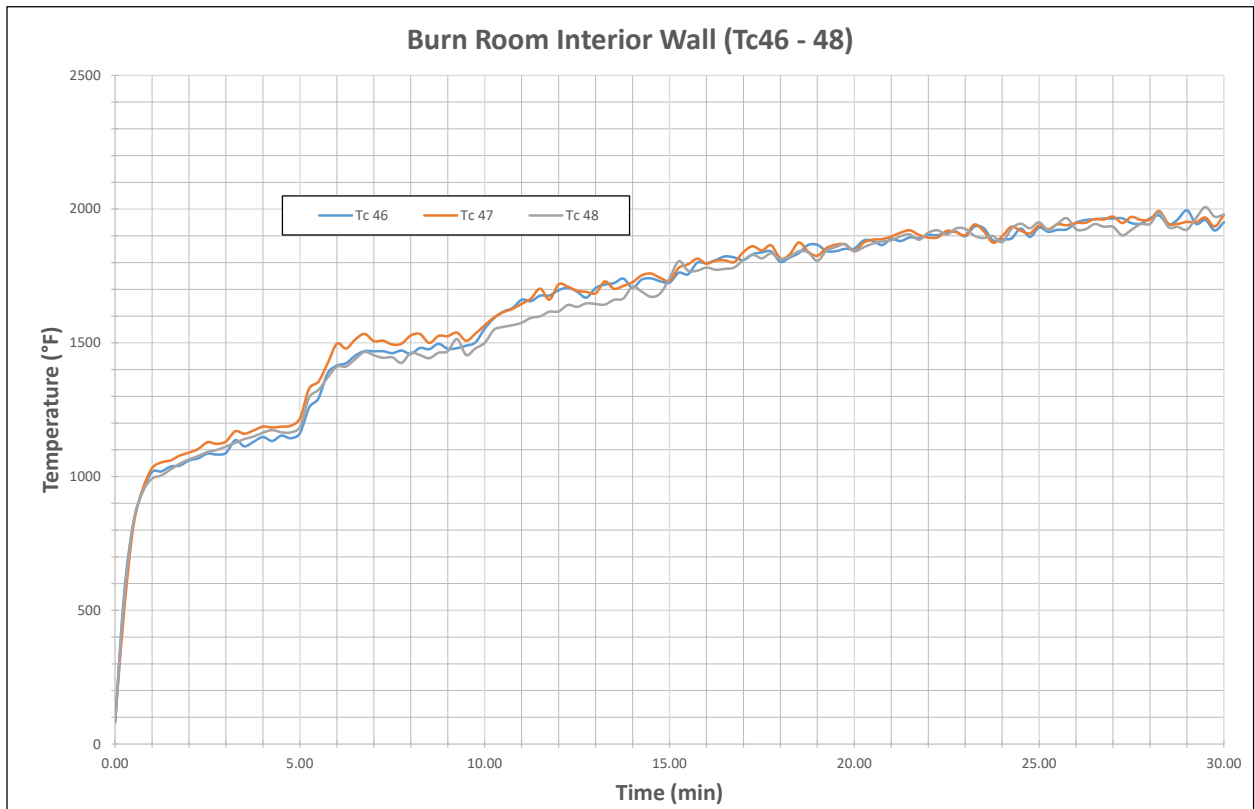
Graph 1: Burn room thermocouple temperature (Tc41 – Tc45)



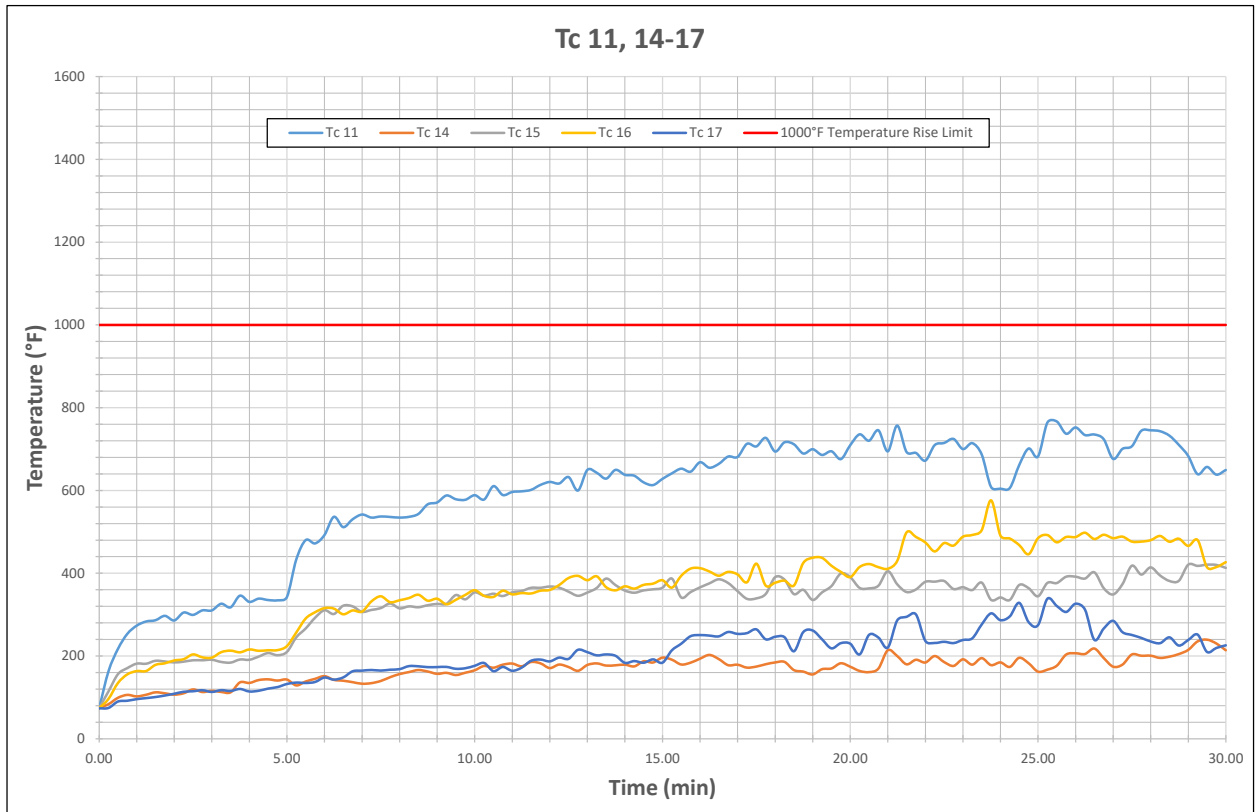
Graph 2: Second story room thermocouple temperatures (Tc49-Tc54)



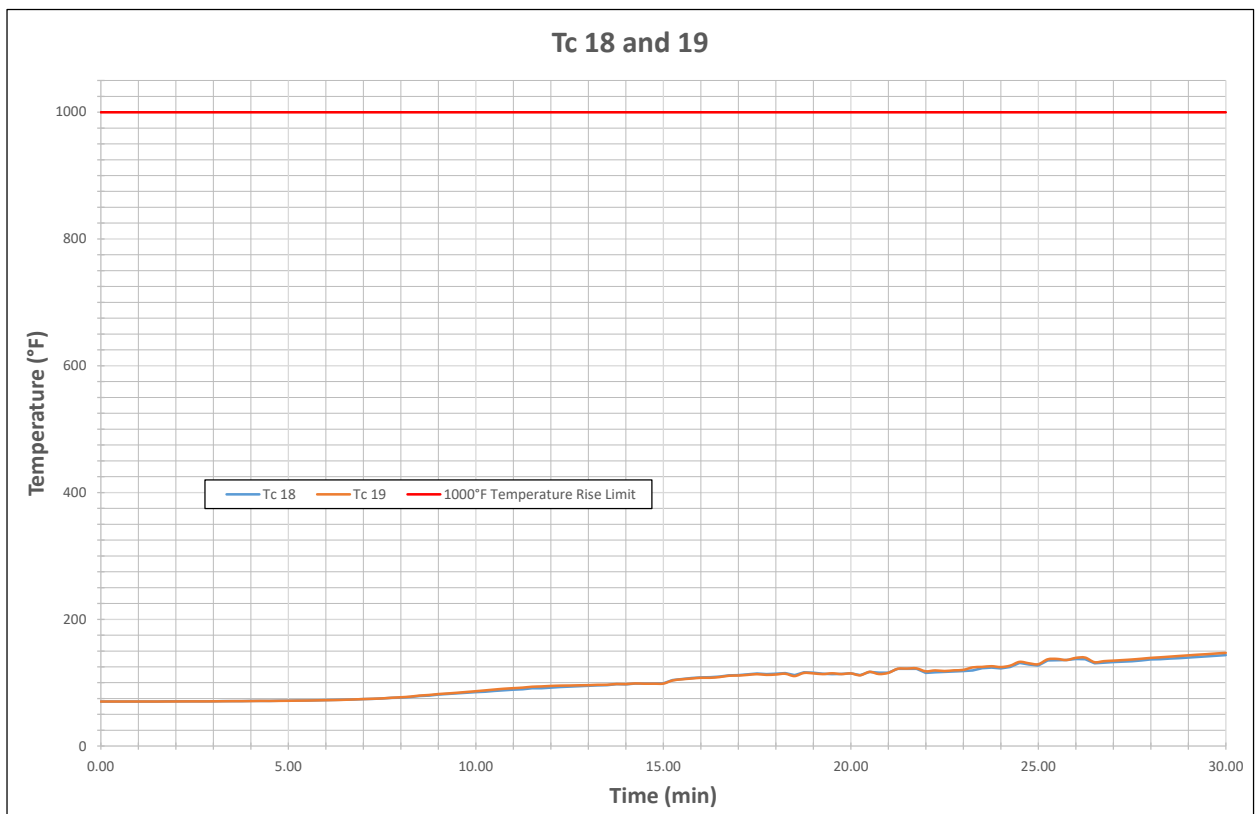
Graph 3: Thermocouple temperatures for Tc1 -Tc10 and Tc12 – Tc13.



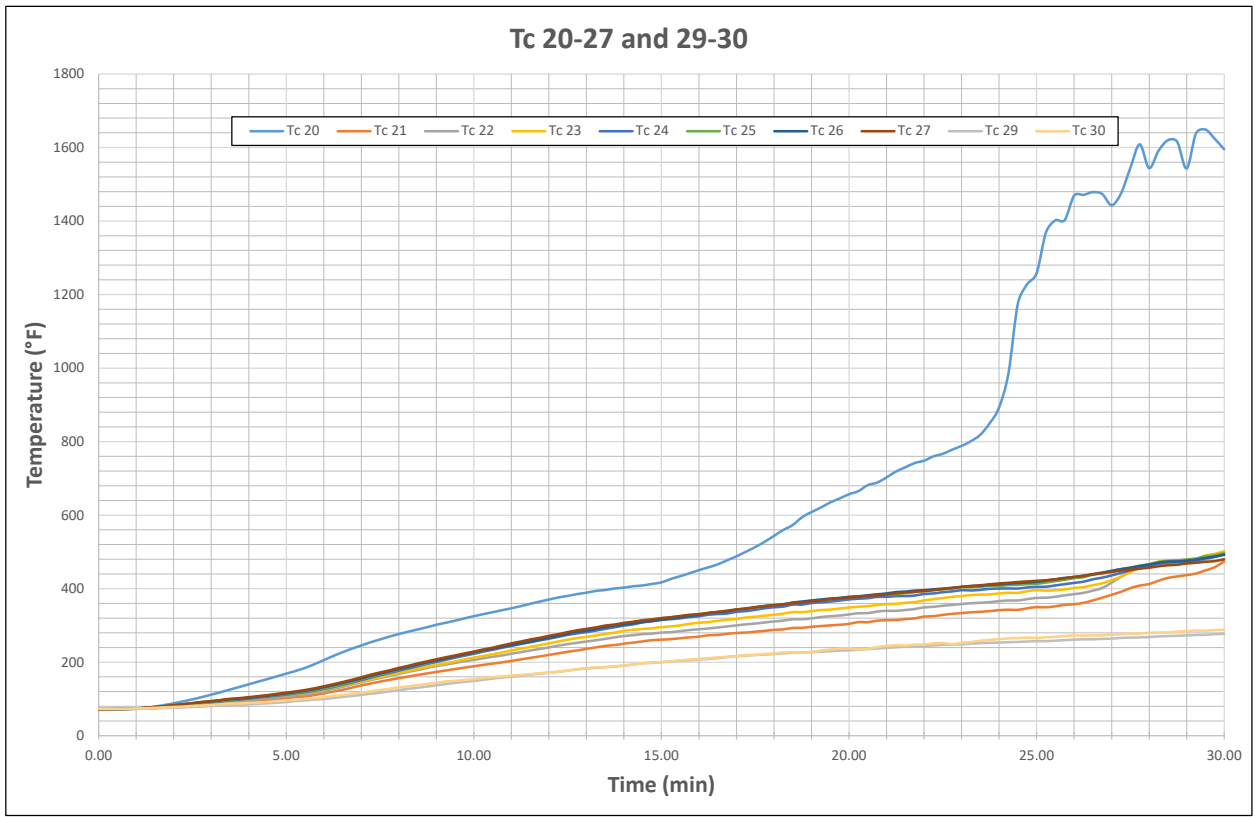
Graph 4: Burn room interior wall temperature (Tc46 – Tc48)



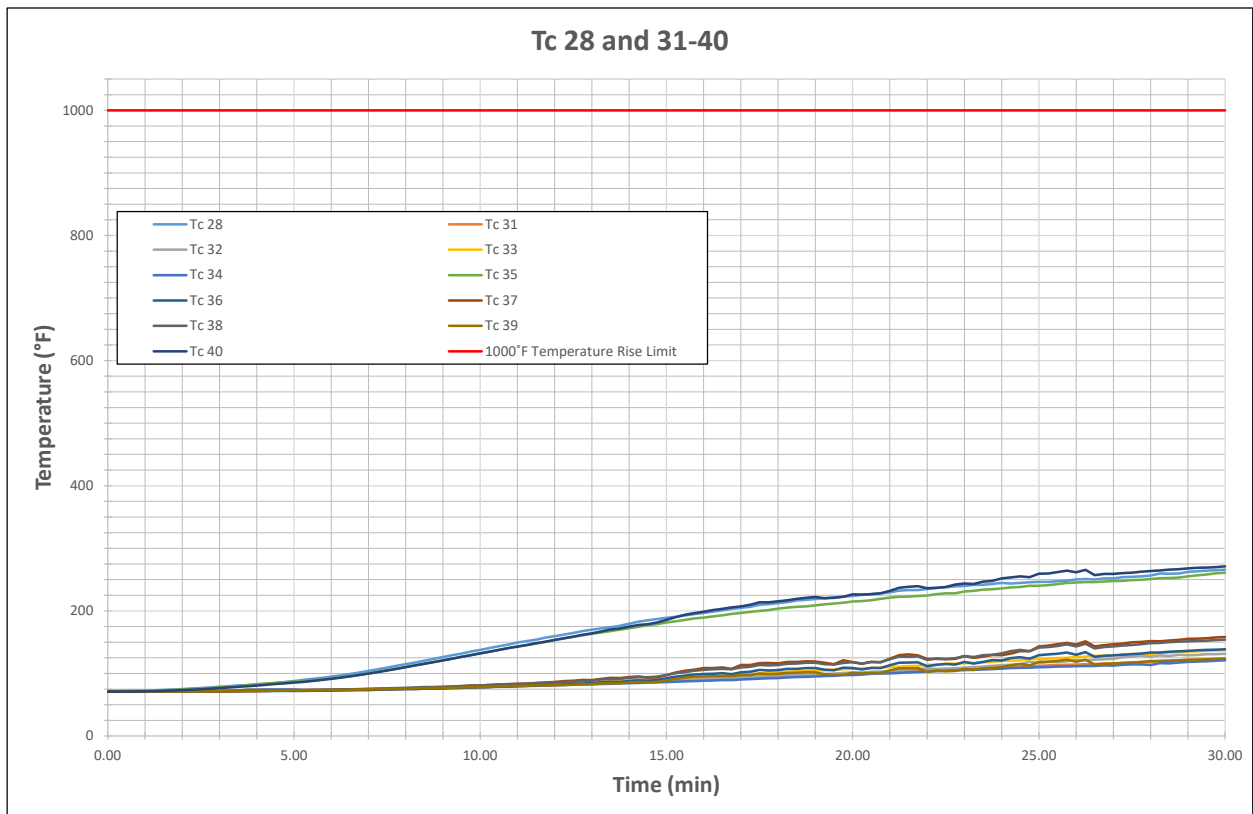
Graph 5: Thermocouple temperatures for Tc11 and Tc14 – Tc17.



Graph 6: Thermocouple temperatures for Tc18 and Tc19.



Graph 7: Thermocouple temperatures for Tc20 – Tc27 and Tc29 – Tc30.



Graph 8: Thermocouple temperatures for Tc28 and Tc31 – Tc40.



19. APPENDIX 7 – CONSTRUCTION PHOTOGRAPHS



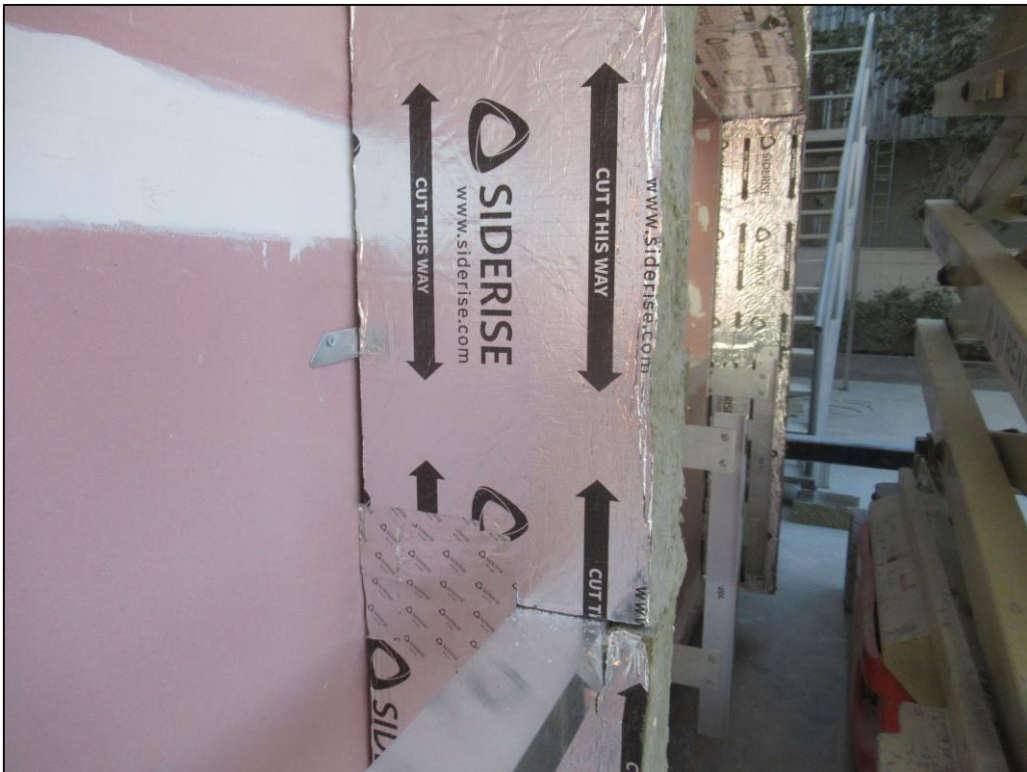
Picture 1: A view of Aluminium Wall bracket fixed to the base wall.



Picture 2: A view of Runner connector used to attach the Vertical Runner to the Horizontal Runner.



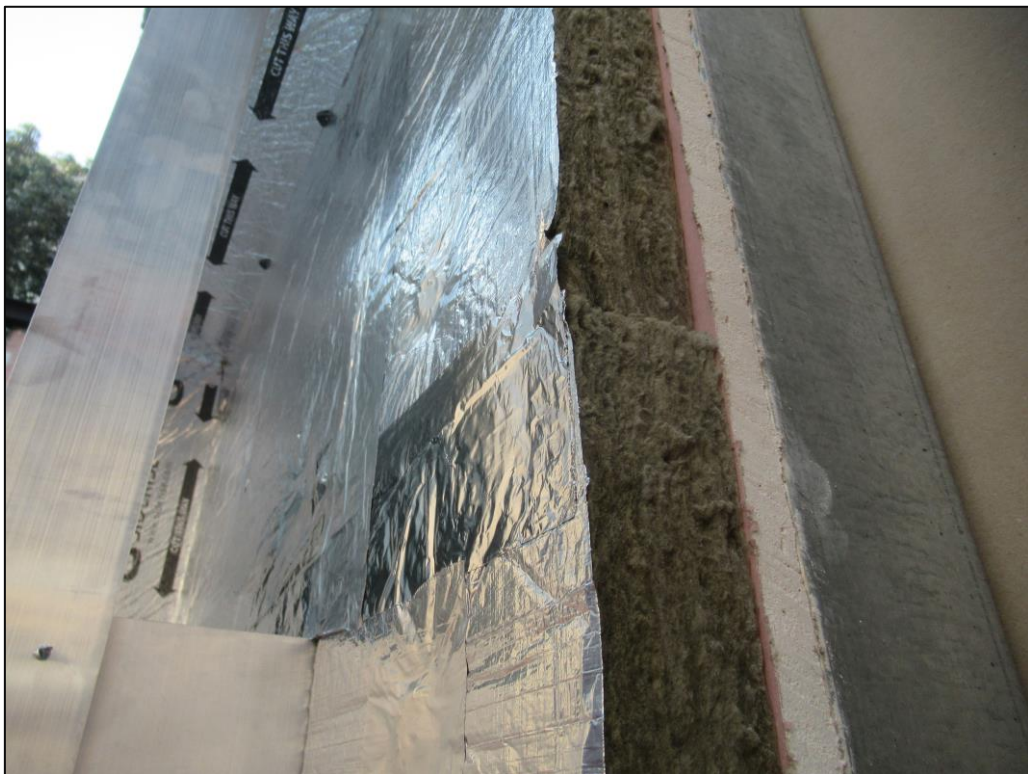
Picture 3: A view of Runners connected to Wall Brackets.



Picture 4: A view of the Cavity Fire Barrier fixed to the Base Wall.



Picture 5: A view of the Prefabricated Aluminium Composite Panel tray profile module.



Picture 6: A view of Cavity Insulation fixing on the system.



Picture 7: A view of the bottom termination of the specimen.



Picture 8: A view of U-Profile fixing in the Panel joint gap.



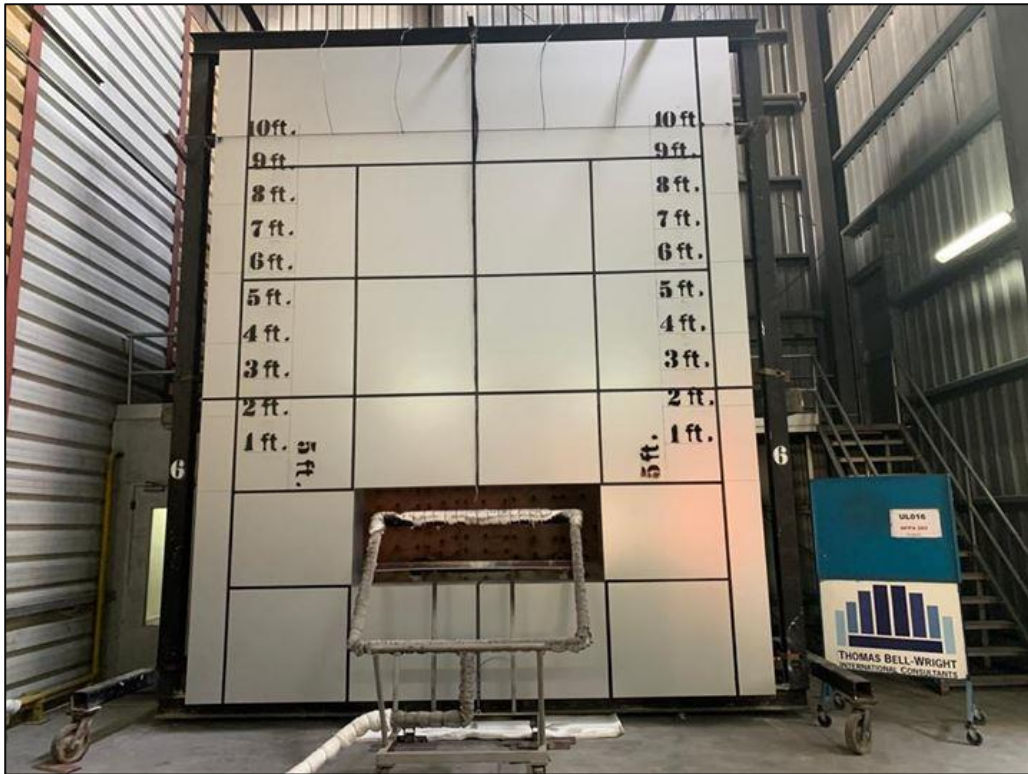
Picture 9: A view of Vertical termination of the system.



Picture 10: A view of the window opening termination of the test specimen.



20. APPENDIX 8 – TEST PHOTOGRAPHS



Picture 11: The specimen at the beginning of the test.



Picture 12: The interior of the base wall in the second floor test room at the beginning of the test.



Picture 13: The specimen at 5:00 minutes and when the window burner was ignited.



Picture 14: The specimen at 10:00 minutes.



Picture 15: The specimen at 15:00 minutes.



Picture 16: The specimen at 20:00 minutes.



Picture 17: The specimen at 25:00 minutes.



Picture 18: The specimen immediately before the end of the test.



Picture 19: The specimen immediately after the gas was shut off, starting the observation period.



Picture 20: The interior of the base wall in the second floor test room at the end of the test.



Picture 21: The specimen at the end of the observation period and end of the NFPA 285 test.



Picture 22: Specimen during dismantling after removal of the external cladding panels.

----- End of Test Report -----